# 4.3 BIOLOGICAL RESOURCES

This section describes environmental and regulatory settings related to the offshore and onshore biological resources in the area; identifies impacts to the biological resources from the proposed Chevron El Segundo Marine Terminal Lease Renewal Project (Project), its principal alternatives, and cumulative impacts from this and other projects in the region; and recommends mitigation measures to reduce those impacts. Appendix G contains information on recreational and commercial fishing and kelp harvesting in the area.

This baseline description of the affected marine and onshore environment is based on reconnaissance-level field surveys, queries of the California Department of Fish and Game's (CDFG) California Natural Diversity Database (CNDDB) and the California Native Plant Society (CNPS), project plans and graphic renderings, the city of El Segundo's Local Coastal Program (LCP), and other relevant data sources including a number of environmental documents that cover the Santa Monica Bay and Southern California Bight (SCB) region (CDFG 2001, CDFG and CINMS 2001, SMBRC 2008). Modeling results pertinent to biological resources in the region are presented in Section 4.1, System Safety and Reliability, and in Appendix C of this Environmental Impact Report (EIR).

## 4.3.1 Environmental Setting

The onshore portion of the proposed Project is bound by the El Segundo Beach public parking lot to the north, Vista del Mar and the Chevron El Segundo Refinery to the east, the Southern California Edison Power plant to the south, and El Segundo Beach and the Pacific Ocean to the west. The site is fully developed with pump stations, a control house, two substations, a helicopter landing pad, and two oil spill command trailers, in addition to concrete and asphalt paving. Other portions of the site contain oil pipelines and other Refinery structures. A reconnaissance survey of the site was performed by walking the entire perimeter of the Marine Terminal and walking representative transects through accessible portions of the site. Inaccessible areas were examined to the maximum extent feasible with binoculars. The survey identified limited natural resources on-site.

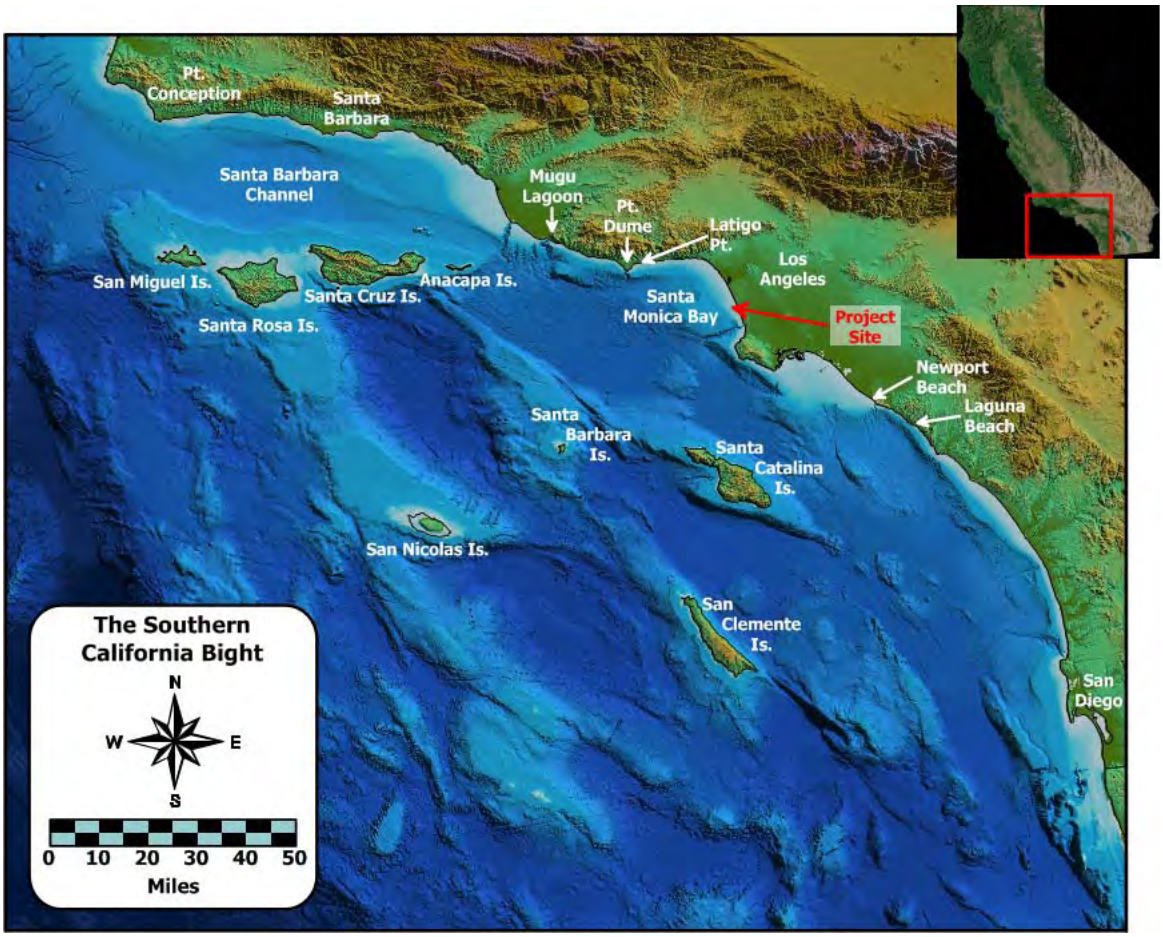
The offshore portion of the proposed Project is leased to Chevron pursuant to state lease PRC 5574 and includes 221 acres (0.9 square kilometers [$km^2$]) of State sovereign land within Santa Monica Bay, which is used as a transfer facility for crude oil

and various petroleum products. Section 2.0, Project Description, details the lease boundaries, which include two circular areas encompassing the active Marine Terminal Berths (3 and 4), pipeline corridors extending from the onshore lease area to the various berths, and a nearby rock groin.

### 4.3.2 Marine Biological Resources

The offshore portion of the proposed Project is located in the south-central part of the Santa Monica Bay near the city of El Segundo, California (Figure 4.3-1). Santa Monica Bay is a large, open-water embayment of the Pacific Ocean that is bordered offshore by the Santa Monica Basin, on each end by the rocky headlands of Point Dume and the Palos Verdes Peninsula, and onshore by the Los Angeles Coastal Plain and the Santa Monica Mountains (SMBRC 2008). It is the natural drainage basin for approximately 414 square miles (1,072.3 $km^2$) of land within the Los Angeles Coastal Plain.

**Figure 4.3-1**
**Project Location within the Southern California Bight**



Santa Monica Bay itself is an integral part of the larger geographic region commonly known as the SCB, wherein the characteristic north-south trending coastline found off much of western North America experiences a significant curvature or indentation south of Point Conception. The SCB includes coastal southern California, the Channel Islands, and the local portion of the Pacific Ocean (Figure 4.3-1).

The portion of the Pacific Ocean that occupies this region, from Point Conception in the north to just past San Diego in the south and extending offshore of San Nicolas Island, is characterized by complex current circulation patterns and a diverse range of marine habitats. The mainland coast and offshore islands contain rocky shores, long stretches of sandy beach, and numerous embayments. A complex series of submarine canyons, ridges, and basins that exceed depths of several hundred meters lie between the mainland and islands

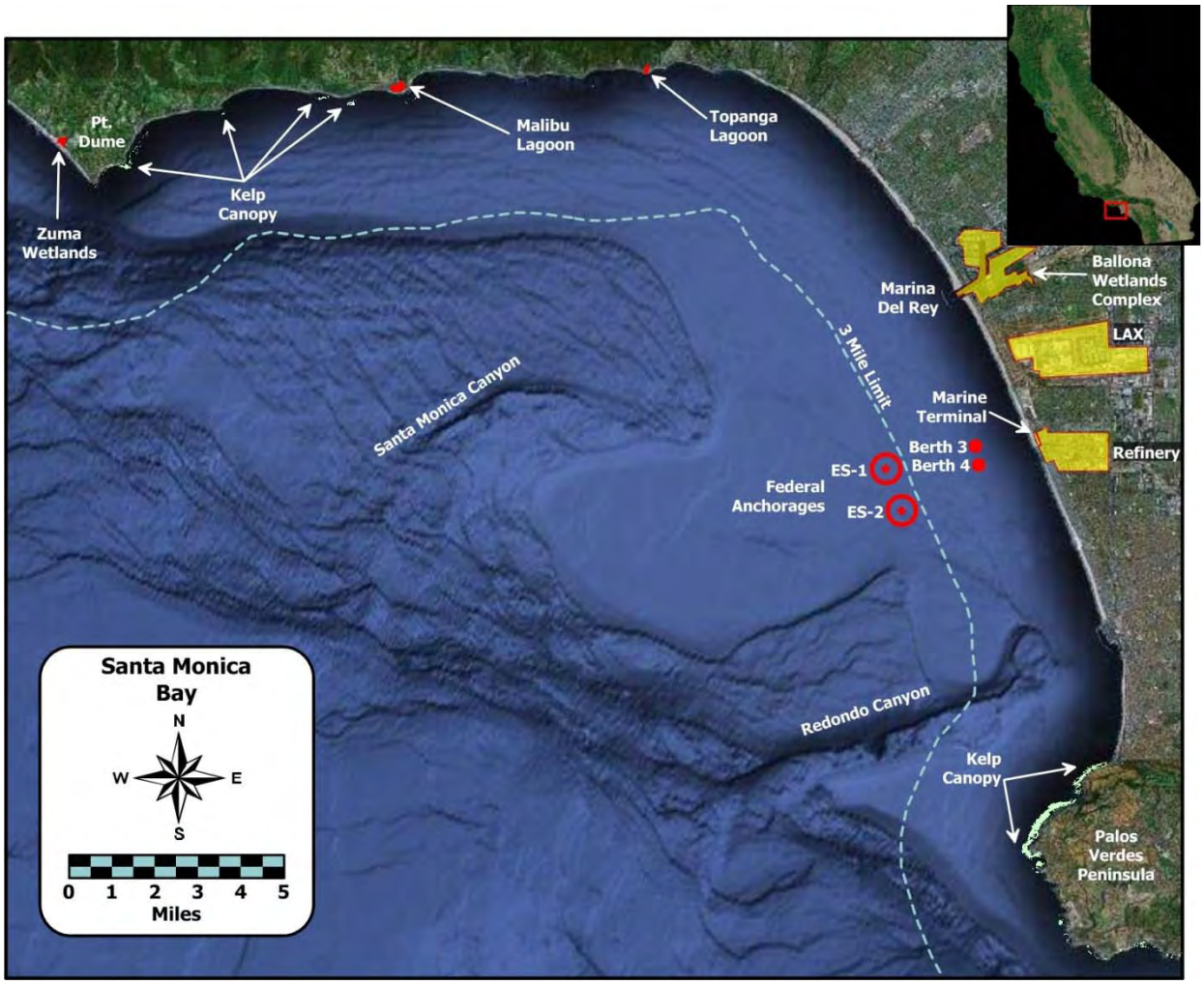
The wide variety of habitats found in the SCB encourage a similarly rich and varied marine life. In particular, the Channel Islands are important breeding grounds for several diminishing populations of marine birds and marine mammal species. Since the Channel Islands are situated some distance from a heavily populated coastline in southern California, they also represent the best examples of pristine environments in the southern California area.

The portion of the Santa Monica Bay near the Project site is characterized by a generally soft, gently sloping bottom incised by two submarine canyons: Santa Monica Canyon to the north and Redondo Canyon to the south (Figure 4.3-2). The Santa Monica Bay lies within the San Diegan marine province. Marine resources of the Bay include a rich diversity of migratory and resident species of mammals, birds, fishes, and invertebrates. The following discussion summarizes the various habitats, marine flora and fauna, sport and commercial fishing resources, rare and endangered species, and other protected species that exist in the immediate Project area and throughout the SCB.

Marine biological resources in the Project area can be described in terms of three major habitat areas: open ocean, seafloor, and shoreline. Within the SCB, each of these three biological habitats is exceptionally diverse and productive. For example, many of the more than 600 fish species reported along the Pacific Outer Continental Shelf (OCS) region occur within the SCB. Eelgrass (*Zostera* spp.) beds, considered to be one of the most productive habitat types found on soft-bottom substrate, occur along the protected shoreline of the Bight, while rocky nearshore substrates often support dense stands of

kelp (*Macrocystis* spp.) (Figure 4.3-2). Additionally, every year more than 27 species of whales and dolphins visit or inhabit the region, including blue whales (*Balaenoptera musculus*), humpback whales (*Megaptera novaeangliae*), and gray whales (*Eschrichtius robustus*). Several species of marine mammals and numerous seabird species preferentially use the shores of the nearby Channel Islands and rocky outcroppings as haul-outs and rookeries.

**Figure 4.3-2**
**Sensitive Biological Resource Areas within the Santa Monica Bay**




Open-Ocean Habitat

Open-ocean, or pelagic, habitat refers to the coastal and open-ocean regions of water above the benthos and away from the shoreline. Organisms utilizing resources in this zone often spend most, if not all, of their lives in a three- dimensional matrix of water, rarely encountering any substrate on which to attach or subsist. The open-ocean

habitat of Santa Monica Bay encompasses approximately 300 square miles (777 $km^2$), extending from the surface to depths of 0.31 miles (0.5 km), and supports plankton, pelagic fish, marine mammals, and foraging areas for a variety of marine birds. Additionally, most of the region's commercial and recreational fisheries occur within the open-ocean habitat.

*Plankton*

Plankton are aquatic organisms that have either limited or no swimming ability and therefore drift or float with the ocean currents. Plankton includes both phytoplankton (plants) and zooplankton (animals).

Phytoplankton, or plant plankton, form the base of the marine food web in the Project area by photosynthesizing organic matter from water, carbon dioxide, and light. Phytoplankton are usually unicellular or colonial algae and provide a food source for zooplankton and fish. Through their decay, phytoplankton also support large quantities of marine bacteria. The local phytoplankton community in the Santa Monica Bay is dominated by dinoflagellates (Order Dinoflagellata), diatoms (Class Bacillariophyceae), and blue-green algae (Class Myxophyceae). Dinoflagellates are usually dominant in the water column; however, diatoms may dominate the community under certain circumstances, such as during upwelling conditions or after intense rainstorms (MBC 1994).

Zooplankton, or animal plankton, are the primary link between phytoplankton and larger organisms in marine food webs. Zooplankton consist of a wide array of organisms that may spend all or only a portion of their life cycle as plankton. All zooplankton, including the larval stages of larger organisms, consume other organisms or organic material.

Animals that remain in the plankton throughout their lives typically include protozoans, gelatinous animals (Classes Scyphozoa and Hydrozoa), and small crustaceans (Class Crustacea). In contrast, the eggs and larvae of many other invertebrates and fish are planktonic, even though the adult stages may eventually become large or strong enough to swim against prevailing currents (nektonic), or settle to the bottom. Pelagic nekton includes larger, mobile invertebrates (shrimp and squid), fish, and marine mammals, as well as bird species which utilize the pelagic habitat for feeding and resting. The most commercially important large nektonic invertebrate in Santa Monica Bay is the California market squid (*Loligo* spp.). Pelagic red crab (*Pleuroncodes planipes*) and jumbo shrimp (*Tribe Caridea*) may also be abundant locally during El Niño periods when equatorial currents bring warmer water to southern California.

The planktonic eggs and larvae of bony fish comprise a large portion of the zooplankton and are referred to collectively as ichthyoplankton. Ichthyoplankton are of importance because of their inherent relationship to the abundance of adult fishes. The most abundant fish larvae in an area are typically those of the most abundant adult species. Ichthyoplankton common in the nearshore waters of the SCB include northern anchovy (*Engraulis mordax*), white croaker (*Genyonemus lineatus*), Pacific sardine (*Sardinops sagax*), queenfish (*Seriphus politus*), California halibut (*Paralichthys californicus*), and sea basses (*Paralabrax* spp.) (Watson et al. 2002, Lavenberg et al. 1986). The most abundant ichthyoplankton collected in the immediate vicinity of the Refinery intake in 2000 were unidentified gobies, white croaker, and northern anchovy. Other fish larvae collected included queenfish, spotted kelpfish (*Gibbonsia elegans*), black croaker (*Cheilotrema saturnum*), California clingfish (*Gobiesox rhessodon*), giant kelpfish (*Heterostichus rostratus*), and slender sole (*Lyopsetta exilis*) (CEC 2002).

While phytoplankton are restricted to the photic zone, where photosynthesis takes place, zooplankton are found throughout the water column. Within the water column, however, certain species are characteristically found at various depths. For example, mysid shrimp are typically encountered in shallow, nearshore waters, while euphausiids (krill) are typically found deeper in the water column. Many zooplankton, including euphausiids and many copepod species, undergo a daily vertical migration, swimming to the surface at night and to deeper waters during the day to avoid predation while maximizing foraging opportunities.

Plankton distribution in the Project area SCB and within Santa Monica Bay tends to be patchy and is characterized by high seasonal and inter-annual variability. Generally, plankton distribution, abundance, and productivity are dependent on light, nutrients, water quality, terrestrial runoff, and upwelling. Because phytoplankton are photosynthetic, they are generally limited to the euphotic zone, while zooplankton can range throughout the water column.

Most phytoplankton blooms in Santa Monica Bay occur in response to local conditions that increase nutrient levels, such as runoff, upwelling, and wastewater discharges. Phytoplankton blooms tend to occur during sunny days in late spring and summer when nutrients are abundant in the mixed layer and there is ample sunlight. Spring values are approximately five times the summer values and approximately ten times the lower winter values (Oguri and Kanter 1971). However, blooms may also occur in fall when stratification breaks down and nutrients from below enter the photic zone (surface to

depth of maximum light penetration). Phytoplankton productivity also tends to be higher near the coastline than farther out to sea.

Another factor in phytoplankton production in the SCB near Santa Monica Bay is the effect of small scale coastal eddies (see Section 4.2, Water and Sediment Quality, for more information on small scale eddies). These eddies appear to play an important role in the formation and maintenance of phytoplankton patchiness in the SCB and have important ramifications for higher trophic levels as well (e.g., larval transport and recruitment). Not surprisingly, zooplankton abundance typically increases immediately following phytoplankton blooms, due in part to the increase in food availability. The volume of zooplankton in the surface waters of the SCB generally ranges from 1.69 to 10.14 ounces per 35,314.67 cubic feet (Goericke et aI. 2004).

Major El Niño events also have an extensive effect on zooplankton populations (Chelton et al. 1982). Anomalies in zooplankton abundance, water temperature and salinity, and southward transport in the California Current are highly correlated across years. Increases in southward transport (La Niña events) are associated with increases in zooplankton production, colder temperatures, and lower salinity, whereas decreases in the southward transport (El Niño events) result in unusually low zooplankton biomass, warmer temperatures, and higher salinity.

*Fishes*

Fish are generally separated into two major groups based on whether they have a bony skeleton (Class Osteichthyes) or rely on cartilage for support (Class Chondrichthyes), (e.g., sharks and rays). The dominant pelagic bony fish species in Santa Monica Bay are Pacific or chub mackerel (*Scomber japonicus*), jack mackerel (*Trachurus symmetricus*), northern anchovy, and Pacific sardine. These species are, not surprisingly, also the primary targets of the commercial fishing industry in southern California. Meanwhile, sharks are the dominant cartilaginous fishes in the pelagic environment of Santa Monica Bay and throughout the SCB, although their abundance has declined in recent decades.

Epipelagic fish reside in the open ocean down to depths of approximately 656 feet (200 meters [m]), where waters are well mixed and support photosynthetic algal communities (i.e., they are well lit). Many epipelagic species within the SCB, including large predators (e.g., tuna, sharks, swordfish, and forage fish) such as northern anchovy, Pacific sardine, Pacific saury (*Cololabis saira*), and Pacific hake (*Merluccius productus*), are widely distributed along the California coast. Some species, such as albacore tuna

and salmon, are known to migrate extensively over vast areas of the Pacific. Pelagic sport fish such as yellowtail (*Seriola lalandi*) and Pacific barracuda (*Sphyraena argentea*) are migratory species that move into the Bay in summer and are often particularly abundant during El Niño years. In contrast, other species, such as rockfish (Scorpaenidae), may live out their entire lives around the offshore oil platforms and natural reefs within the region.

Other species found in the Bay include queenfish, jacksmelt (*Atherinopsis californiensis*), and topsmelt (*Atherinops affinis*) in shallow depths, and rockfish (*Sebastes* spp.) along the outer shelf. White croaker and white seaperch (*Phanerodon furcatus*) school in the water column but feed on the bottom. Vermillion rockfish (*Sebastes miniatus*), bocaccio (*Sebastes paucispinis*), and sablefish (*Anoplopoma fimbria*) feed in the water column at night but remain associated with the bottom during the day (MBC 1993).

At least 40 species of sharks and rays are known to occur in the SCB region. Some large sharks may inhabit the SCB during seasonal migrations, while others may permanently reside in the area. Many smaller sharks and rays are permanent residents of the nearshore coastal areas. Leopard sharks (*Triakis semifasciata*), for example, are one of the most common sharks in California bays and estuaries and along southern California beaches. They are a popular sport fish in nearshore waters, where they are commonly caught from piers and jetties. Historically, the most abundant sharks in the area include blue sharks (*Prionace glauca*), thresher sharks (*Alopias vulpinus*), and basking sharks (*Cetorhinus maximus*). Shark species also support several important commercial fisheries in the region, most notably thresher, mako (*Isurus* spp.), and blue sharks.

Large great white sharks (*Carcharodon carcharias*) are uncommon in southern California; however, two of the juvenile white sharks displayed at the Monterey Bay Aquarium in the past decade have been captured from the waters in or near Santa Monica Bay. White sharks are thought to give birth in southern California waters, and use inshore waters as a nursery area. Great white sharks feed on fish, rays, and small sharks.

Commercial and Recreational Fisheries

Commercial and recreational fishing activities occur at various locations within the study region that could potentially be impacted by activities associated with the proposed Project. In particular, a wide variety of finfish and shellfish species are harvested in the

region, while kelp is harvested in specific beds managed by the CDFG. An analysis of fishery and kelp data collected around the Project area for the ten-year period from 1996 to 2007 forms the basis for the summary of commercial and recreational fishing that is included in Appendix G of this EIR.

*Marine Birds*

The SCB supports a rich population of seabirds (Baird 1993), providing a major foraging area for both residents and migrants. Much of the taxonomic diversity in the region arises because the SCB acts as the transition zone between two zoogeographic provinces. The northern portions of the SCB (i.e., the Santa Barbara Channel), support boreal seabird populations, such as Cassin's auklets, that are more characteristic of colder regions as far north as the Gulf of Alaska. Conversely, the Channel Islands also harbor important nesting colonies for subtropical seabirds, such as those found in the Gulf of California. The latter include California's entire nesting populations of both the recently delisted California brown pelican (*Pelecanus occidentalis californicus*), and the state-threatened Xantus' murrelet (*Synthliboramphus hypoleucus*). Both species have southern breeding distributions and also nest on islands off Baja California. As such, the distribution of the various seabird taxa within the region exhibits substantial seasonal and spatial variation (Pierson et al. 1999, MMS 2001).

Seabirds can be segregated into two main groups, coastal and pelagic. Coastal seabirds feed in the pelagic realm but tend to remain within approximately five miles (8 km) of the mainland shore. Common coastal seabirds include Western and Clark's grebes, surf scoters (*Melanitta perspicillata*), cormorants (*Phalacrocorax* spp.), loons (*Gavia* spp.), California brown pelicans, and gulls (Subfamily Laridae). The highest coastal seabird densities occur in the SCB during winter months. However, California brown pelican populations generally peak in the summer months when birds from large Mexican colonies migrate northward.

In contrast, pelagic seabirds spend most of their time farther from shore. As with coastal seabirds, they spend much of their time on the sea surface or diving into the water column to feed. As a result, they are particularly vulnerable to oil spills. Some of the most common offshore birds in the region include: shearwaters (*Puffinus* spp.), northern fulmars (*Fulmarus glacialis*), phalaropes (*Phalaropus* spp.), jaegers (*Stercorarius* spp.), and common murres (*Uria aalge*). Storm-petrels (*Oceanodroma* spp.), puffins (*Fratercula* spp.), and auklets (Family Alcidae) also frequent the offshore waters of the Project area. Seasonal population peaks vary among the taxa, but pelagic seabirds as a group are comparatively stable (MMS 2001). Most seabird rookeries in

the region are located on offshore islands, predominately the northern Channel Islands; few, if any, seabirds nest on the mainland coast of the SCB (Carter et al. 1992).

Feeding strategies vary among seabirds, with California brown pelicans and terns, including the endangered California least tern (*Sterna antillarum browni*), diving into the water from the air to catch fish, while cormorants (*Phalacrocorax* spp.), murres, puffins, and auklets dive from the sea surface in pursuit of fish and zooplankton. Red-necked phalaropes (*Phalaropus lobatus*) feed at the sea surface using a characteristic spinning pattern that causes fish eggs and other planktonic species to accumulate immediately underneath them.

Special Status Seabirds

Seabird species occurring in the Project area that are protected under either the State or Federal Endangered Species Acts (FESA) are potentially vulnerable to impacts from the proposed Project in the event of an oil spill (see Table 4.3-1). These species include the state-threatened Xantus' murrelet (*Synthliboramphus hypoleucus*), and the recently delisted bald eagle (*Haliaeetus leucocephalus*) and California brown pelican. Table 4.3-1 also includes several additional seabirds classified as species of concern by CDFG: the ashy storm petrel (*Oceanodroma homochroa*), rhinoceros auklet (*Cerorhinca monocerata*), California gull (*Larus californicus*), double-crested cormorant (*Phalacrocorax auritus*), and black storm petrel (*Oceanodroma melania*).

**Table 4.3-1**
**Special Status Seabirds of the Southern California Bight**

| Common Name | Scientific Name | Status |
|---|---|---|
| California brown pelican | *Pelecanus occidentalis californicus* | Delisted in 2009[1] |
| Xantus' murrelet | *Synthliboramphus hypoleucus* | State Threatened |
| Ashy storm petrel | *Oceanodroma homochroa* | SSC |
| California gull | *Larus californicus* | SSC |
| Double-crested cormorant | *Phalacrocorax auritus* | SSC |
| Black storm petrel | *Oceanodroma melania* | SSC |
| Rhinoceros auklet | *Cerorhinca monocerata* | SSC |
| Bald eagle | *Haliaeetus leucocephalus* | State Endangered; Delisted in 2007[1] |

Notes: SSC = State Species of Special Concern
[1] Delisted from the FESA.

### *California Brown Pelican*

California brown pelicans are large, fish-eating birds commonly seen foraging in the nearshore waters from British Columbia to southwest Mexico. Serious declines in the southern California population due to bioaccumulation of chlorinated hydrocarbon pesticides (DDT, DDE, dieldrin, and endrin) led to both state and federal listing of the pelican in the early 1970s (USDOI/MMS 1996). Bioaccumulation of these pesticides resulted in serious eggshell thinning and poor reproductive success (Schreiber and Risebrough 1972). Habitat loss, human disturbance of nest sites, excessive commercial fishing, and food scarcity (primarily anchovies) also contributed to the species' decline (Ehrlich et al. 1992, Keith et al. 1971).

Pelicans forage by plunge diving, open-mouthed, from heights up to 66 feet (20 m) above the ocean surface, feeding on small schooling fish (e.g., anchovies) (Bent 1926, USFWS 1982). This mode of feeding makes them particularly vulnerable to the effects of oil spills. Offshore rocks and coastal habitats, such as rocky shores, sandy beaches, and piers, provide important roost sites for brown pelicans. Birds return to specific roosts each day and do not normally remain at sea overnight. These roosts are usually located in regions of high oceanic productivity and are isolated from predation pressure and human disturbances.

Nesting colonies of brown pelicans are located from the Channel Islands south to the islands off Nayarit, Mexico. While the majority of nesting takes place in Baja California, some occurs on the Channel Islands (Garrett and Dunn 1981, USFWS 2008). Most of the U.S. breeding population (4,000 to 6,000 pairs) nests on West Anacapa Island, although smaller populations have become established on the other Channel Islands. In 2005, the first known nesting at Middle Anacapa Island occurred. Additionally, in 2005, small numbers were found to be breeding on East Anacapa Island (only the second time since 1928), and an expanded distribution of pelican nesting was observed at Santa Barbara Island. Furthermore, in May 2006, 43 pelican nests were found on Prince Island, a small islet off San Miguel Island. These were the first nests seen in this location since 1939.

The breeding season for brown pelicans extends from March through early August. During this time, non-breeding pelicans, including juveniles and non-breeding adults, disperse along the mainland coast as far north as southern British Columbia, Canada, and south into southern Mexico and Central America. Within the SCB, the numbers of California brown pelicans are generally highest in summer, and lowest in late winter and early spring (Lehman 1994). Mainland areas favored for congregating generally have

fresh water for bathing (such as river mouths) and quiet places for resting and preening, and often are adjacent to ocean waters with good fish populations.

Estimates of the U.S. breeding population size for the brown pelican were approximately 6,000 pairs in 1991 (Carter et al. 1992). However, in 2006 approximately 11,695 breeding pairs were documented at ten locations throughout the SCB (USFWS 2008). The pelican population on West Anacapa Island has averaged approximately 4,600 nesting pairs annually during the past decade, peaking at nearly 8,000 nesting pairs in 2004. To the south on neighboring Santa Barbara Island, there has been an annual average of approximately 1,500 nesting pairs in the past ten years, with an estimated high of 4,000 nests in 2006 (NPS 2008a).

Increases in the apparent population prompted calls to delist the brown pelican as an endangered species. In February 2008, the USFWS concurrently published its 12-month finding on the original petition for delisting and proposed a final rule for delisting (USFWS 2008). In February 2009, the California Fish and Game Commission voted unanimously to delist the pelican as a state endangered species. The USFWS formally delisted the pelican in November 2009. At that time, the primary regulatory authority for protection of this species became the Migratory Bird Treaty Act.

***Xantus' Murrelet***

The Xantus' murrelet is a small diving bird of the family Alcidae, which includes puffins and murres. It is listed as threatened by the state of California, and is currently a candidate for listing under the FESA because of its limited breeding range, small and declining global population size, and vulnerability to multiple threats, including predation, oil spills, and loss of habitat (Wolf et al. 2005). The murrelet is thought to breed on 13 islands or island groups between Point Conception, California, and Punta Abreojos in Baja California. The entire global population is currently estimated between 5,000 and 10,000 breeding pairs. The Mexican colonies support at least half of this worldwide population, while approximately 3,000 birds breed on the Channel Islands, primarily Santa Barbara Island.

Murrelets subsist on zooplankton and small fish including northern anchovies, sardines, rockfish, Pacific sauries, and crustaceans. They spend most of their lives at sea, far from the mainland, and come ashore only to breed. Their nesting period extends from February through July, but may vary depending on food supplies. During the nesting season, they forage in the immediate vicinity of the colony. Nests are located in natural rock crevices or under shrubs, especially along or near cliffs. Xantus' murrelets are

nocturnal when attending to their eggs and chicks, complicating efforts to monitor their population (Whitworth et al. 1997). They lay only one to two eggs per year, and usually return to the same nest site to breed each year. In the non-breeding season, the majority of the population winters in the waters of the California Current from 20 to 60 miles (32 to 96 km) offshore. During this time, murrelets are occasionally seen as far north as Washington and southern British Columbia. They are usually seen traveling in pairs or small family groups while at sea.

Current threats to the population of Xantus' murrelet include native and non-native predators and competitors, oil pollution, changes in oceanography and prey availability, and by-catch in fisheries. Predation by introduced mammals, especially black rats, feral cats, and deer mice have taken a particular toll on the murrelet over the last century, resulting in its extirpation from a number of islands (Whitworth and Carter 2002). Recently, concerns have also arisen over the effects of artificial light pollution from fishing and other vessels that overnight near the island colonies, potentially attracting birds to their death by collision or contamination aboard ship. Additionally, because of their very limited range, especially during the breeding season, an oil spill near a major breeding colony could affect a large proportion of the global population of this species. Pollution of its marine environment by oil or other materials could have substantial deleterious effects on this species or its food supply.

***California Gull***

California gulls are considered a California Species of Special Concern. The breeding population in California has declined due to human-related habitat changes at the interior colonies and associated introductions of predators. California gulls nest primarily inland (on islands in lakes) and visit the coast during the non-breeding season (late summer through March). Along the coast, California gulls prefer sandy beaches, mudflats, rocky intertidal and pelagic areas of marine and estuarine habitats, and wetlands. California gulls are omnivorous and feed on garbage, carrion, fish, earthworms, insects, and brine shrimp.

***Double-Crested Cormorant***

The double-crested cormorant is a large, colonial, heavy-bodied water bird that occurs widely in freshwater and marine habitats along both the North American coast and throughout the interior. In marine environments, double-crested cormorants preferentially feed in relatively shallow, open coastal and estuarine waters (Boekelheide et al. 1990). Adept swimmers, they feed primarily on subsurface schooling fish.

Dense nesting colonies and roost sites are often located near large estuaries and offshore rocks. Unlike other water birds, cormorants do not have well-developed oil glands to protect their feathers from getting wet and must visit perches periodically during the day to dry out their plumage. Like the brown pelican, the cormorant suffered substantial declines due to pesticide bioaccumulation and habitat disturbance and destruction. It was subsequently listed as a California species of concern. Currently, approximately 364,000 pairs currently nest in North America (Hatch 1995).

Double-crested cormorants are found throughout much of California, although breeding populations in southern California are highly localized, predominately on the Channel Islands (Carter et al. 1992). Inland colonies in the region exist along the San Gabriel River, at Lake Henshaw, Anaheim Lake, and the Salton Sea (Gallagher 1997). Breeding for this species generally occurs from April to August, although inland colonies at the Salton Sea begin breeding as early as January.

***Storm Petrels and Auklets***

Like the Xantus' murrelet, ashy and black storm-petrels and rhinoceros auklets are pelagic, nocturnal, cavity-nesting birds that come ashore primarily for breeding-related activities. Their primarily nocturnal behavior is thought to be an evolutionary adaptation to limit predation by diurnal predators such as gulls. Each of these birds is considered a species of concern in California, due to their small or declining population sizes and inherent threats to their unique breeding island habitats. These species spend most of their time far out at sea, and they breed primarily on offshore islands from the Farallones, south to the Channel Islands, making them particularly vulnerable to the potential oil spill impacts from the proposed Project. For example, approximately 1,600 rhinoceros auklets were killed or debilitated off central California during the 1986 Apex Houston oil spill (Page et al. 1990). The estimated breeding population in California is approximately 1,700 individuals. Within the SCB, these pelagic species are most commonly observed well beyond the shelf break, in areas adjacent to submarine canyons and other deep water features, or around the islands on which they breed. As such, their presence near the Marine Terminal itself is unlikely.

***Bald Eagle***

Until 2007, the bald eagle was a listed species protected under the FESA. The national bird is a type of sea eagle found only in North America and is an integral component of the Channel Islands ecosystem. Bald eagles once numbered 50,000 in the United States; nesting areas were reported from at least 35 different locations on the Channel

Islands from the 1800s through 1950. By the early 1960s, however, bald eagles had disappeared from the Channel Islands and were in decline nationwide due to human impacts, primarily the release of contaminants, such as the pesticide dichlorodiphenyltrichloroethane (DDT), into the marine environment. Bioaccumulation of these contaminants resulted in the thinning of the eagle's egg shells and dramatic declines in reproductive success. By the time the U.S. restricted the use of DDT in 1972, only 800 breeding pairs of eagles remained nationwide.

Under the protection of the FESA, bald eagles made a steady recovery. The total number of breeding pairs in the United States currently exceeds 10,000, with approximately 200 nesting pairs found in California. Given its successful recovery, the bald eagle was officially delisted from its threatened status in the lower 48 states on June 28, 2007. The bald eagle is still protected, however, under both the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act (Eagle Act).

The bald eagle is a keystone species in the Channel Islands ecosystem. In the absence of bald eagles, non-native golden eagles established themselves on the northern Channel Islands, which led, in turn, to a precipitous decline of the native island fox due to predation. The re-establishment and continued success of bald eagle populations on the Channel Islands are considered key components to maintaining the unique ecosystem of these islands. In the spring of 2006, two eagle chicks hatched on Santa Cruz Island. This was the first time bald eagles had successfully reproduced on the Channel Islands, without human help, since 1949. In the spring of 2008 four nests were established on the northern Channel Islands, three on Santa Cruz Island, and one on Santa Rosa Island. However, only two of the nests produced chicks. Meanwhile, on Catalina Island, five nests produced a total of seven eaglets in 2008 (NPS 2008b).

*Marine Mammals*

Because of its transitional location between the cooler (Oregonian) zoogeographic province to the north of Point Conception and the subtropical (San Diegan) province to that comprises most of southern California's waters, the SCB supports a wide variety of marine mammals. Marine mammals reported within the area are represented by more than 40 species, all of which are protected under the Marine Mammal Protection Act (MMPA). These include 34 species of cetaceans (whales, dolphins and porpoises) and six species of pinnipeds (seals and sea lions) (Carretta et al. 2005, Leatherwood et al. 1982 and 1987, Leatherwood and Reeves 1983, and Reeves et al.1992). Additionally, the southern sea otter (*Enhydra lutris nereis*), a representative of the weasel family, Mustelidae, is also found in the region. Six species of cetaceans are federally listed as

endangered, while two species of pinnipeds and the southern sea otter are listed as threatened under the FESA.

Marine mammal species in the region can be classified into three categories: (1) migrants that pass through the area on their way to calving or feeding grounds; (2) seasonal visitors that remain for a limited time; and (3) residents that remain much or all of the year. Five whale species transit the Project area during annual migrations while all but one of the dolphin species have resident populations within the area. The Santa Monica Bay is located near the geographic middle of the SCB. As such, marine mammal species whose extreme range limit is the SCB, such as the northern fur seal and the southern sea otter, are not likely to be encountered in the immediate Project area.

Cetaceans

Cetaceans (whales, dolphins, and porpoises) occur in the Project area year-round, although the species present may vary from season to season or from year to year. Cetacean population levels are generally at their lowest in spring and their highest levels during the autumn (Dohl et al. 1983a). The order Cetacea is divided into two suborders: mysticetes (baleen whales) (Table 4.3-2) and odontocetes (toothed whales, dolphins, and porpoises) (Table 4.3-3). Among the primary differences between these two groups is how they feed. Mysticete whales have evolved a very specialized feeding mechanism; they filter food-laden water through brush-like plates of baleen with their tongues. Baleen whales also differ from odontocetes because they have a double blowhole on top of the head while the toothed whales have one blowhole on top of the head that divides into two nostrils inside the head. Although a total of eight species of baleen whales occur in the SCB, the majority of these whales use the coastal waters of the SCB as migratory routes or are seasonal visitors (Carretta et al. 2005, Leatherwood et al. 1982 and 1987, Leatherwood and Reeves 1983).

Five species, the California gray whale, humpback whale, blue whale, fin whale (*Balaenoptera physalus*), and minke whale (*Balaenoptera acutorostrata scammoni*) can be expected to occur within the Project area (Dohl et al. 1983a, Carretta et al. 2006) (Table 4.3-2). The remaining three whale species are only rarely sighted in the SCB, or are generally found far offshore. Five of the whales are considered endangered under the FESA and the California Endangered Species Act. These listings were largely in response to worldwide population declines from intensive commercial whaling.

Tables 4.3-2 and 4.3-3 summarize the cetacean species known to occur in the SCB. For each species, these tables include the common name and scientific name, stock designation, population or stock size estimate, and protection status. Additionally, the tables contain the species' habitat preference, occurrence, and seasonality in the SCB, and their potential for occurrence near the Project site, which is near the geographic middle of the SCB (Figure 4.3-1).

***Blue and Humpback Whales***

The blue whale population off the California coast consists of approximately 2,000 individuals, while recent estimates place the Eastern North Pacific population of humpbacks at approximately 1,400 individuals (Carretta et al. 2005). Both whales are listed as endangered under the FESA, and are considered strategic and depleted under the MMPA. The eastern North Pacific stock of blue whales has appeared more abundant over the past 14 years, but whether this indicates a stock increase or merely a distributional change is unknown at this time (Carretta et al. 2005).

In the SCB, both species appear during the summer months; humpbacks generally arrive in late May and the first blue whales appear in June with abundance peaking from August through October. Both species remain through the summer before heading farther north, to the waters off central or northern California. Humpbacks often head farther north in late summer, sometimes reaching the Washington coast; however, the U.S.-Canada border appears to mark the northern range limit for this stock (Carretta et al. 2005). Regardless, the whales generally leave California by November, although specimens are occasionally reported throughout the year (Larkman and Veit 1998, Calambokidis 2000). The stock of both species spend winter in the waters off Central America and Mexico, where they breed and calve.

Humpbacks have been observed feeding on krill (*Euphasia* spp.), northern anchovy, and Pacific sardines (Howorth 1992-2006). Both blue whales and humbacks are frequently spotted by shoreline observers from the bluffs of the Palos Verdes Peninsula. Therefore, humpback or blue whales appearing in or near the Project area or along the transport routes used by tankers visiting the Marine Terminal is likely.

**Table 4.3-2**
**Mysticetes (Baleen Whales) of the Southern California Bight**

| Common Name | Scientific Name | Stock Size | Stock Designation | Regional Habitat | Occurrence in SCB | Likelihood at site | Protected Status |
|---|---|---|---|---|---|---|---|
| Fin whale | *Balaenoptera physalus* | 3,279 | California Oregon Washington | Oceanic, coastal and continental shelf | Common from March to October | Possible | Federal and State Endangered; MMPA |
| Blue whale | *Balaenoptera musculus* | 1,744 | Eastern North Pacific | Oceanic, coastal and continental shelf | Common from June through November | Possible | |
| Humpback whale | *Megaptera novaeangliae* | 1,391 | Eastern North Pacific | Oceanic, coastal and continental shelf | Common from May through November | Possible | |
| Sei whale | *Balaenoptera borealis* | 56 | Eastern North Pacific | Oceanic | Rare; seen in spring and summer | Remote | |
| North Pacific right whale | *Eubalaena japonica* | Unknown; <100 | Eastern North Pacific | Coastal and continental shelf | Extremely rare | Remote | |
| California gray whale | *Eschrichtius robustus* | 18,178 | Eastern North Pacific | Coastal and continental shelf | Common from December through May | Likely | MMPA; CA Fish & Game Code[2] |
| Minke whale | *Balaenoptera acutorostrata scammoni* | 1,015 | California Oregon Washington | Coastal and continental shelf | Uncommon | Possible | |
| Bryde's whale | *Balaenoptera edeni* | 12[1] | California Oregon Washington | Oceanic | Rare | Remote | |

[1] Bryde's whale is known only from E. tropical Pacific stock; however, estimate was derived for the California/Oregon/Washington area by Carretta et al. (2005).
[2] California Fish and Game Code Section 4500
Sources: Carretta et al. 2005, Angliss et al. 2005, USGS 2005, NMFS and USFWS 1998a-d.

**Table 4.3-3**
**Odontocetes (Toothed Whales, Dolphins, and Porpoises) of the Southern California Bight**

| Common Name | Scientific Name | Stock Size | Stock Designation | Regional Habitat | Occurrence in SCB | Likelihood at site | Protected Status |
|---|---|---|---|---|---|---|---|
| Sperm whale | *Macrocephalus physeter* | 1,233 | California Oregon Washington | Oceanic, basins and sea mounts | Uncommon, generally observed from spring to fall | Remote | Federal Endangered; MMPA |
| Dwarf sperm whale | *Kogia simus* | Unknown | California Oregon Washington | Continental slope to oceanic | Rare | Remote | MMPA; CA Fish & Game Code[3] |
| Pygmy sperm whale | *Kogia breviceps* | 247 | | | | | |
| Hubb's beaked whale | *Mesoplodon carlhubbsi* | 1,247 | | Continental slope to oceanic | Rare | Remote | |
| Blainville's beaked whale | *Mesoplodon densirostris* | | | | | | |
| Ginkgo-toothed whale | *Mesoplodon ginkgodens* | | | | | | |
| Perrin's beaked whale | *Mesoplodon perrini* | | | | | | |
| Stejneger's beaked whale | *Mesoplodon stejnegeri* | | | | | | |
| Baird's beaked whale | *Berardius bairdii* | 228 | | Continental slope to oceanic | Rare, sightings from late spring to early fall | Remote | |
| Cuvier's beaked whale | *Ziphius cavirostris* | 1,656 | | 0.25-0.5 nm[4] of shore | Rare, sightings in fall and winter | | |
| Killer whale | *Orcinus orca* | 84 | Southern Resident | Coastal waters | Rare | Remote | Federal Endangered; MMPA |
| | | 466 | Offshore | Offshore | Uncommon | Remote | MMPA; CA Fish & Game Code |
| | | 346 | Transient | Coastal waters | Uncommon, spring | Possible | |
| False killer whale | *Pseudorca crassidens* | Not available for SCB | None for SCB | Continental shelf to oceanic | Rare, sightings in summer and early fall | Remote | |
| Short-finned pilot whale | *Globicephala macrorhynchus* | 304 | California Oregon Washington | Offshore islands to oceanic | Rare | Remote | |

**Table 4.3-3**
**Odontocetes (Toothed Whales, Dolphins, and Porpoises) of the Southern California Bight**

| Common Name | Scientific Name | Stock Size | Stock Designation | Regional Habitat | Occurrence in SCB | Likelihood at site | Protected Status |
|---|---|---|---|---|---|---|---|
| Risso's dolphin | *Grampus griseus* | 16,066 | California Oregon Washington | Continental shelf; escarpments | Common year-round | Possible | MMPA; CA Fish & Game Code |
| Long-beaked common dolphin | *Delphinus capensis* | 43,360 | California | Coast to 50 nm offshore | Common year-round, with peak in summer and fall | Likely | |
| Short-beaked common dolphin | *Delphinus delphis* | 449,846 | California Oregon Washington | Coast to 300 nm offshore | Common year-round with late fall to spring peak | Likely | |
| Bottlenose dolphin | *Tursiops truncatus* | 206 | Coastal | To 0.6 nm offshore | Common year-round | Likely | |
| | | 5,065 | Offshore | Offshore | | Unlikely | |
| Pacific white-sided dolphin | *Lagenorhynchus obliquidens* | 59,274 | California Oregon Washington | Continental shelf | Common in late spring and summer | Possible | |
| Northern right whale dolphin | *Lissodelphis borealis* | 20,362 | | | Uncommon, sightings in late winter and spring | Unlikely | |
| Spotted dolphin | *Stenella attenuata* | Not available for SCB | None for SCB | Continental shelf to oceanic | Rare: sightings in summer and early fall | Remote | |
| Striped dolphin | *Stenella coeruleoalba* | | | | | | |
| Long-snouted spinner dolphin | *Stenella longirostris* | | | | | | |
| Rough-toothed dolphin | *Steno bredanensis* | | | | | | |
| Dall's porpoise | *Phocoenoides dalli* | 99,517 | California Oregon Washington | Continental shelf | Common in winter and early spring | Possible | |
| Harbor porpoise | *Phocoena phocoena* | 1,884 | Morro Bay | Continental slope to oceanic | Uncommon | Remote | |

[3] California Fish and Game Code Section 4500
[4] nm = nautical miles
Sources: Carretta et al. 2005; Angliss et al. 2005; Howorth 1995 and 1998. USGS 2005; NMFS and USFWS 1998a-d.

### *Fin Whale*

Fin whales are the world's second-largest mammals behind blue whales. In the SCB, fin whales are most often seen in summer and early fall. Fin whales off California frequent waters from the continental slope seaward, although they are occasionally seen along escarpments frequented by humpback and blue whales in the region (Carretta et al. 2005). Fin whales are commonly observed in the San Pedro Channel by whale watchers from atop the Palos Verdes Peninsula. They are also frequently spotted south of the Project area, near San Clemente Island. In January 2009, a fin whale entangled in fishing line was observed within the San Pedro Channel. Additionally, in April 2009, a 60-foot fin whale was struck and killed by a 900-foot container ship transiting between the Santa Barbara Channel and San Pedro Bay, though the exact location of the strike is unknown. It was the third fin whale mortality within the SCB from a known ship strike in less than one year. It is expected that fin whales will appear sporadically near the Project site and along the transport routes used by tankers visiting the Marine Terminal, particularly during the summer months.

### *Minke Whale*

Minke whales are the smallest of the baleen whales found in North American waters. Off the shore of southern California, these baleen whales are usually sighted individually or in small groups of two to three. Although most whale species encountered in the SCB are migratory, minke whales in the inland waters off California are considered "residents" because they establish home ranges. Small numbers of these whales are sighted each year during the annual gray whale migration counts performed by the American Cetacean Society from the bluffs of the Palos Verdes Peninsula.

### *California Gray Whale*

The California gray whale is the most common baleen whale that passes through the Project area. In 1994, following the recovery of the stock with the cessation of commercial whaling in the first half of the 20th century, the eastern population of gray whales in the North Pacific was removed from the list of endangered species under the FESA. The eastern Pacific gray whale population reached an estimated high of approximately 26,000 individuals in 2000. Since then, the population has subsided somewhat and currently consists of approximately 19,000 to 23,000 individuals (NOAA 2006).

Most gray whales pass through the SCB twice each year as they travel between feeding grounds in the north and calving grounds in Mexico. Gray whales remain relatively close to the coastline during their migration, with the majority found over continental shelf waters, particularly on the northbound portion of their journey (Herzing and Mate 1984, Reilly 1984, Rice et al. 1984, Rugh 1984, Dohl et al. 1983a, Sund and O'Connor 1974).

Small numbers of gray whales have been reported traveling southbound through the SCB as early as October and November. However, the bulk of the southbound migration in this region does not begin in earnest until late December and generally continues through February. By mid-February however, some whales are already beginning to return on their northbound trip. The northbound migration generally peaks in March, but continues into May. Mothers with calves are usually the last to depart on the journey north (Leatherwood et al. 1982 and 1987, Leatherwood and Reeves 1983).

Gray whale migration corridors generally follow the mainland coast for much of the way. However, they diverge south of Point Conception, with one track extending along the north side of the northern Channel Islands and branching through the islands, and others following the coast through the Santa Barbara Channel. In general, southbound whales stay farther offshore, while the northbound whales follow the coast more closely.

From December 2008 through 15 May 2009, 677 gray whales, including 52 cow and calf pairs, were observed passing through the nearshore waters off the Palos Verdes Peninsula during their northward migration (ACS 2008). Similarly during the 2008 migration, 634 northbound gray whales were observed. Of these, approximately 63 were cow and calf pairs. During the 2007 migration approximately 783 northbound whales, including 58 calves, were counted by observers at Point Vicente on the Palos Verdes Peninsula. Using these counts, NOAA's National Marine Fisheries Service (NMFS, also sometimes referred to as NOAA Fisheries Service) personnel estimated the gray whale population during 2007 at approximately 20,110 gray whales (ACS 2008). It is therefore expected that gray whales will appear sporadically near the Project site, particularly during the spring months when they are migrating north. Over the last quarter century, the numbers of migrating gray whales observed from the Palos Verdes peninsula have varied substantially, with southbound numbers ranging from 301 to 1,291, and northbound counts ranging from 727 to 3,412 whales.

Occasionally, gray whales will stop to feed opportunistically during their migration, particularly in the spring. Whales have been observed throughout the SCB feeding on

amphipods in giant kelp beds, sand crabs (*Emerita analoga*) along the surf line, and on krill farther offshore (Anderson 1995, Howorth 1965-2006). The vast majority of gray whales do not linger in the region, they continue their journey to the feeding grounds of the far north.

### *Sei Whale*

Sei whales, primarily an open-ocean, temperate-water species, are only infrequently sighted in the region. In the eastern North Pacific, sei whales migrate northward from calving and wintering grounds in temperate and subtropical waters to summer feeding grounds that extend from the Channel Islands to Alaska. Although their winter range stretches from southern Mexico to central California, sei whales are uncommon in California waters and are generally sighted far offshore.

Commercial whaling reduced Sei whale numbers from an estimated world population of 256,000 to approximately 50,000. The population in the North Pacific is currently estimated at 7,000 to 13,000 individuals (Carretta et al. 2005). Capable of outrunning sail and rowboats, sei whales were protected from the impacts of whaling for many years. However, this changed with the advent of motorized chasers, and sei whales were successfully harvested off the California coast as recently as the 1950s and 1960s (Daugherty 1985, Rice 1974). Sei whale sightings in the SCB have been rare for more than 20 years. Additionally, most of the whales seen are well offshore, usually during the spring and summer months. Considering their preference for deeper, offshore waters, the chance of encountering sei whales near the Project site or along the transport routes used by tankers visiting the Marine Terminal is considered remote.

### *North Pacific Right Whale*

Once found throughout the north Pacific, from central California to the Arctic, North Pacific right whales (*Eubalaena japonica*) are now among the rarest of all marine mammals with an estimated population of less than 100 individuals (MMS 2001). These large, slow moving whales have a thick layer of blubber, attributes which made them a particularly attractive target for the whaling industry. With the initiation of whaling in the north Pacific in the early nineteenth century, this species soon became scarce, and from 1855 to 1982, only 23 reliable sightings were noted (Scarff 1986).

It is believed that North Pacific right whales summer in the Bering Sea and Gulf of Alaska, but may winter as far south as Baja California, Mexico. Since 1996, small numbers of right whales have been observed in the southeastern Bering Sea, including

an aggregation estimated at 24 animals in the summer of 2004 (NMFS 2006). Critical habitat for this species, encompassing a total of approximately 36,750 square nautical miles within the Gulf of Alaska and the Bering Sea, went into effect in 2006.

The southernmost sighting in recent years was off Cabo San Lucas, Baja California, Mexico (Gendron et al. 1999). Historically, only two sightings have been made in SCB, and there is little evidence that the region was ever an important habitat for right whales (NMFS 2006). Considering the overall scarcity of the North Pacific right whale, the odds of it appearing near the Project site are extremely remote.

***Bryde's Whale***

The taxonomic status of the Bryde's whale remains poorly understood, with scientists currently suggesting that there may actually be up to as many as three species: Bryde's whale (*Balaenoptera brydei*), Bryde's/Eden's whale (*Balaenoptera edeni)* (Olsen 1913), and a pygmy form, Omura's whale (*Balaenoptera omurai*) (Wada et al. 2003). The differences between the proposed species are based on geographic distribution, inshore and offshore forms, and size.

Regardless, Bryde's whales are large baleen whales that occur worldwide in tropical and warm temperate oceans (from 40° South to 40° North). They are usually sighted individually or in pairs, although reports of loose aggregations of up to twenty animals have been associated with feeding areas. Like other baleen whales, Bryde's whales feed opportunistically on plankton (e.g., krill and copepods) and crustaceans (e.g., pelagic red crabs, shrimp), although they are known to eat more schooling fish (e.g., anchovies, herring, mackerel, pilchards, and sardines) than many other baleen species. Off the coast of California, Oregon, and Washington, there is only a small population, estimated at twelve animals. Therefore, this species is highly unlikely to be encountered near the Project site.

***Sperm Whale***

Sperm whales are the largest of the toothed whales, or odontocetes, found in the SCB. Found year-round in California waters, sperm whale abundance peaks from April through mid-June and from the end of August through mid-November. Sperm whales spend most of their time in deep waters and are rarely spotted near shore. Their principal prey are large squid, but they also eat large demersal and mesopelagic sharks, skates, and fishes. Sperm whales generally travel in small family units (females) or bachelor "schools" (males), although as males get older they are often more solitary.

***Killer Whale***

Killer whales, which are actually a type of large delphinid or dolphin, are among the most easily recognized of the odontocetes in the SCB. They are highly social animals that typically travel in matrilineal family groups (pods) of up to 50 individuals, although most pods are much smaller. They favor sub-temperate to cold temperate waters.

Three stocks of killer whales have been documented off the coast of California, which are distinguished by their social behavior, physical appearance, preferred food, and vocal dialects (NOAA and NMFS 1999b and c, Carretta et al. 2005). They are referred to as the offshore, southern resident, and transient stocks.

The offshore stock of killer whales has been reported up to 300 nautical miles (nm) (500 km) offshore from California through Washington, and even as far north as southeast Alaska. Little is known about the offshore killer whales, since they are seldom seen in coastal waters, generally remaining nine miles (15 km) or more offshore (Carretta et al. 2005). This stock feeds primarily on salmonid fishes. The southern resident (coastal) stock consists of three large pods that generally summer in the inland waters of Washington (San Juan Islands and Puget Sound) and southern British Columbia. During winter months, whales from this stock have been spotted foraging as far south as central California. This stock was listed as endangered in 2007 due to its declining numbers, which are currently approximately 84. Given their preferred ranges and life histories, individuals from the offshore and resident stocks are not likely to appear in the immediate Project area.

The third killer whale stock, the transient stock, ranges from southern California to as far north as Alaska and eastern Russia and is the only one of the three stocks reasonably expected to be encountered in the Project area. Population trends in California are not known at this time, although sightings of increasingly large pods of transient orcas are being reported more often, particularly during the northbound gray whale migrations (Connally 2005). Although their presence is uncommon, they are occasionally observed in the waters of the San Pedro Channel. Throughout the 1980s a small pod frequented the area commonly enough to earn the moniker ‘L.A. pod’ for its proximity to Los Angeles.

Unlike the other killer whale stocks, transients mainly prey on other marine mammals. North of the Project site, in the Santa Barbara Channel, transient killer whales have been observed feeding on gray whales, Pacific harbor seals, California sea lions, and fish along the mainland coast (Howorth 1965-2006; Sussman 1988). In April 2006, a

group of five orca whales was documented attacking a gray whale and her calf off Santa Barbara. Killer whales have also been known to attack sperm whales, and even great white sharks off California (Pyle et al. 1999).

### *Dolphins and Porpoises*

Although whales are generally the most highly publicized of the cetaceans found off southern California, several dolphin species actually account for the majority of the cetacean presence found in the region. The two species of common dolphin (*Delphinus delphis*) account for 57 to 84 percent of the total seasonal cetacean population in the SCB (Dohl et al. 1981). Other commonly encountered delphinids in the SCB include the Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), the northern right whale dolphin (*Lissodelphis borealis*), Risso's dolphin (*Grampus griseus*), and Dall's porpoise (*Phocoenoides dalli*). These species vary in their patterns of usage of the area and periods of peak abundances (Dohl et al. 1983a). In contrast, Dall's and harbor porpoises (*Phocoena phocoena*) are boreal species that only occasionally travel as far south as the Santa Barbara Channel. Dall's porpoise (*Phocoenoides dalli*) is a conspicuously colored black and white porpoise that ranges along the coast within 20 miles (32 km) of shore.

Common dolphins (*Delphinus delphis*), Pacific white-sided dolphins (*Lagenorhynchus obliquidens*), and the bottlenosed dolphins (*Tursiops truncatus*) are often sighted running with ships (Orr 1972). Risso's dolphin (*Grampus griseus*), grayish with conspicuous white streaks, may travel in small groups. Less frequently, the North Pacific pilot whale (*Globicephala macrorhynchus*), which travels in pods of up to 200 individuals, is also seen off the southern California coast.

#### Pinnipeds

Six species of pinnipeds are found offshore southern California (Table 4.3-4). Four of the species are year-round residents in the SCB, while the remaining two are uncommon visitors but have previously maintained substantial populations within the region (CINMS 2005). Only two of the pinniped species, the California sea lion (*Zalophus californianus*) and the harbor seal (*Phoca vitulina*), are expected to be encountered in the immediate vicinity of the Project site with any regularity, although the resident populations of California sea lions, northern fur seals, and northern elephant seals all maintain breeding colonies on San Miguel Island, the northernmost of the Channel Islands.

**Table 4.3-4**
**Pinnipeds and Fissipeds of the Southern California Bight**

| Common Name | Species Name | Occurrence in SCB | Likelihood at site | Protected Status |
|---|---|---|---|---|
| California sea lion | *Zalophus californianus* | Year-round resident | Likely | MMPA & CA Fish & Game Code |
| Harbor seal | *Phoca vitulina* | | Likely | |
| Northern fur seal | *Callorhinus ursinus* | | Remote | |
| Northern elephant seal | *Mirounga angustirostris* | | Remote | State Fully Protected [1] |
| Northern (Stellar) sea lion | *Eumetopias jubatus* | Rare visitor | Remote | Federal Threatened |
| Guadalupe (Southern) fur seal | *Arctocephalus townsendi* | Occasional visitor | Unlikely | Federal and State Threatened; State Fully Protected |
| Southern sea otter | *Enhydra lutris nereis* | Year-round resident | Remote | Federal Threatened; State Fully Protected |

[1]The classification of Fully Protected was California's initial effort in the 1960s to identify and provide additional protection to those animals that were rare or faced possible extinction.

[2]Fish and Game Code Section 4500

Sources: Adapted from Bonnell and Dailey 1993, CDFG 2004c.

### *California Sea Lion and Harbor Seal*

California sea lions are the most abundant pinnipeds offshore California and are the most commonly sighted pinniped in the Santa Monica Bay. California sea lions maintain rookeries on the offshore islands, including San Miguel Island, and frequently rest on nearshore rocks and navigation buoys. Harbor seals are also very common along the California coast and may come into bays and harbors but do not exhibit the overt social behavior of sea lions. Along the outer coast both species haul out on offshore rocks or may rest on sand bars at low tide. Unlike the wide-ranging sea lions, however, harbor seals forage relatively close to shore, with 75 percent remaining within 6.2 miles (10 km) of the shoreline (MMS 2001). Harbor seal rookeries are mostly located in central and northern California, with the nearest established mainland rookeries located in the Santa Barbara Channel at Carpinteria and near San Diego.

### *Northern Fur Seal*

Northern fur seals (*Callorhinus ursinus*) are largely endemic to boreal waters to the north, although they established a small breeding colony on San Miguel Island in the 1960s and appear to have had a more substantial presence at the island historically (Walker et al. 1999, CINMS 2005). Most of the population remains in offshore waters

west of San Miguel Island. They reach their peak in the region in winter and spring, as migrants from the Bering Sea arrive to overwinter in California waters. The population of San Miguel seals was 9,424 individuals as of 2007.

### *Northern Elephant Seal*

The northern elephant seal (Mirounga angustirostris) is a fully protected species in California and a conservation success story. Once hunted to the brink of extinction, today the northern elephant seal population maintains several rookeries on the Channel Islands as well as an established mainland haul-out and rookery at Piedras Blancas on the central coast of California (The Marine Mammal Center 2001). Although abundance estimates are difficult to determine for this species because all age classes are not ashore at the same time, the California stock was estimated at 101,000 in 2001 (Caretta et al 2002). Worldwide, the population is estimated at approximately 150,000 individuals. Northern elephant seals normally haul out on land only to breed and molt. Otherwise, they disperse widely at sea and spend relatively little time in southern California waters.

### *Stellar Sea Lion*

Northern (Stellar) sea lions (*Eumetopias jubatus*) are also uncommon visitors to the SCB from more northern waters (MMS 2001). They maintain breeding colonies off the central and northern coast at Año Nuevo Island and the Farallon Islands. Although they have previously bred at San Miguel Island, they are no longer present there. The last sighting of a Stellar sea lion on San Miguel Island was in 1983.

### *Guadalupe Fur Seal*

The Guadalupe (southern) fur seal (*Arctocephalus townsendi*) is both a federally threatened species and California threatened and fully protected species. Like other pinnipeds, Guadalupe fur seals were reduced to near extinction by commercial sealing in the nineteenth century. While still small, the population of this species is estimated to now exceed 7,000 individuals.

Guadalupe fur seals breed along the eastern coast of Guadalupe Island, approximately 125 miles (200 km) west of Baja California. Limited breeding is thought to now occur on Benito Este Island as well. Although it is currently only an occasional visitor from the south, archeological data suggest that as little as 5,000 years ago, the Guadalupe fur seal was actually the most populous pinniped on San Miguel Island (Walker et al. 1999). However, other than a lone pup born on San Miguel Island in 1997, no successful

breeding has occurred on the islands in recent years, and sightings of this species in the SCB are infrequent. Individuals have been sighted in the southern Channel Islands however, including two males who established territories on San Nicolas Island. In recent years, increasing numbers of Guadalupe fur seals have been seen on and around the Channel Islands, and individuals have been found stranded as far north as the central California coast. It is not yet known whether these sightings and strandings are a result of El Niño events (warmer water pushing their prey northward), or if they represent attempts at recolonization of their former range.

Fissipeds

The southern sea otter population is listed as a federally threatened species and California fully protected species because of its small size, limited distribution, susceptibility to marine pollution, and competition with fishermen. In California, otters live in waters less than 65 feet (20 m) deep and rarely move more than one mile (1.6 km) offshore, where they feed almost entirely on large invertebrates including abalone, urchins, sea stars, and scallops. Two hundred years ago, demand for the otter's pelt nearly led to its extinction. However, in the early 1900s, a small remnant population of approximately 50 animals was discovered off Big Sur in central California, which has since repopulated much of the coast north of Point Conception. In recent years, however, their range has extended south of the Point and into southern California (USGS 1997, 1998, 1999, 2000, and 2005).

The recently completed 2009 census count indicates that there are currently approximately 2,654 otters offshore California (USFWS 2003, USGS 2009). Otters currently range along the mainland coast between Point San Pedro (in the north) and Rincon Point in Ventura County. Additionally, a small group of otters exists at San Nicolas Island. Additionally, in 1987, the U.S. Fish and Wildlife Service (USFWS) began a translocation program and relocated 139 otters to San Nicholas Island (USFWS 2000). In 2002, the translocated colony at San Nicolas Island contained approximately 27 individuals, including pups (USFWS 2003).

Because of the continued presence of significant numbers of otters southeast of Point Conception, the otters' range is now recognized as extending south to Coal Oil Point, in Santa Barbara (USGS 2008). As described in Section 4.1, System Safety and Reliability, the worst case impacts to the California mainland for the tanker spill scenarios were those in which the oil was blown into the Santa Barbara Channel and then onto the coast near Santa Barbara (Figure 4.1-7), where oil could potentially impact areas now inhabited by sea otters. As the population grows, otters are expected

to continue to expand their range southward along the California coastline. Although otters are not likely to be encountered in the immediate Project area for some time, their growing presence in the SCB means that they will be increasingly vulnerable to oil spills that could occur in association with the proposed Project over the course of the lease renewal.

*Marine Turtles*

Though uncommon in the region, four species of marine turtles are known to inhabit the waters off the northeastern Pacific Ocean off the coast of California, all of which are protected under the FESA. They are the green turtle (*Chelonia mydas*), the olive ridley turtle (*Lepidochelys olivacea*), the leatherback turtle (*Dermochelys coriacea*), and the loggerhead turtle (*Caretta caretta*) (Hubbs 1977). The green, olive ridley, and loggerhead turtles are listed as federally threatened species, while the leatherback is listed as a federally endangered species (Table 4.3-5).

**Table 4.3-5**
**Marine Turtle Species in California Waters**

| Common Name | Scientific Name | Occurrence in SCB | Likelihood at Site | Protected Status |
|---|---|---|---|---|
| Green turtle | *Chelonia mydas* | Uncommon | Possible | Federal Threatened. Breeding populations in Florida and Mexico are listed as Federal Endangered |
| Loggerhead turtle | *Caretta caretta* | Uncommon | Possible | Federal Threatened |
| Olive ridley turtle | *Lepidochelys olivacea* | Rare | Unlikely | Federal Threatened. Breeding populations in Mexico are listed as Federal Endangered |
| Leatherback turtle | *Dermochelys coriacea* | Uncommon | Unlikely | Federal Endangered |

Source: NOAA 2008, Caretta et al. 2005

The leatherback is the most frequently encountered turtle off California, followed by the green, loggerhead, and olive ridley sea turtles (Stinson 1984); however, most leatherback sightings are concentrated north of Point Conception. Within the central and southern portions of the SCB, green and loggerhead turtles are the most commonly encountered species. Marine turtles in the SCB generally occur in greatest abundance from July through September.

Green Turtle

The east Pacific green turtle is listed as a federally threatened species except for the breeding population on the Pacific coast of Mexico, which is listed as federally endangered. Green turtles are the most commonly observed marine turtle along the southern California coast. Although no nesting beaches exist along the southern California coast, two colonies of turtles are currently known to persist year-round in the region. One colony resides in San Diego Bay, while another group of approximately 30 turtles is now recognized as residing where warm water is discharged into the brackish mouth of the San Gabriel River from a Long Beach power plant (the Los Angeles Department of Water and Power's Haynes Generating Station).

Though rare in general, green turtles are the second most commonly stranded sea turtle found along the California coast; 62 percent of the strandings of this species are found in a band southward from southern California. From 1982 to 2006 a total of one dead green and two live loggerhead sea turtles were entrained in the intake of the nearby El Segundo generating station. Green sea turtles are also occasionally seen elsewhere along the California coast, usually in El Niño years when the ocean temperature is higher than normal.

Adult east Pacific green turtles are primarily herbivorous, eating sea grasses and algae, and, in some areas, they may feed on a variety of marine animals. Forage areas exist in bays and inlets along the coast of Baja California (Mexico) and southern California; however, these vital areas have yet to be delineated. Green turtles attain sexual maturity at an average age of 25 years and can live for up to 60 years. They generally remain within close proximity to the ocean surface and their dives are generally confined to shallower depths. Prey items consist of molluscs, polychaetes, fish, fish eggs, jellyfish, and commensal amphipods.

Leatherback Turtle

The leatherback sea turtle is listed as federally endangered throughout its entire range. The most recent estimate of the world population is currently 25,000 to 42,000 turtles. They are highly migratory, exploiting convergence zones and upwelling areas along the continental margins and open ocean. They feed from the surface to a maximum depth of 0.6 miles (1,000 m) during all hours of the day and night, but normally feed between 165 and 275 feet (50.3 and 83.8 m).

There are two stocks of Pacific leatherbacks: one nesting on beaches in the Indonesian province of Papua and the other at sites in Costa Rica and Mexico (Shillinger et al 2008, and Dutton et al 2000). Leatherbacks along the west coast of California are comprised of individuals originating from nesting assemblages in Indonesia while the Costa Rican and Mexican leatherbacks typically head to South America. They nest and lay their eggs in the sandy beaches of Indonesia and the Solomon Islands, then swim 7,000 miles (11,265.4 km) across the Pacific to their feeding grounds along the California coast. No nesting activity in California is known. Approximately 300 leatherbacks visit the California coastal waters north of Point Conception annually. In the past 25 years, the leatherback population has declined by more than 90 percent, mostly due to the loss of nesting beaches. The "Recovery Plan for U.S. Pacific Populations of the Leatherback Turtle" states that the leatherback is the most common sea turtle in U.S. waters north of Mexico.

Loggerhead Turtle

The loggerhead turtle is listed as a federally threatened species throughout its range. Loggerheads are a cosmopolitan species, found in temperate waters and inhabiting pelagic waters, continental shelves, bays, estuaries, and lagoons. The U.S. and Mexico (primarily Baja California south) support important developmental habitats for juvenile loggerheads. There is no documented nesting in the U.S. Pacific, although U.S. waters (principally those off California) are used as foraging grounds and as migratory corridors for a wide range of juvenile size classes.

California sightings of loggerhead turtles generally consist of juveniles that have crossed Pacific Ocean after hatching on beaches in Japan (Stebbins 2003). Sightings are typically confined to the summer months in the eastern Pacific, peaking in July to September off southern California and southwestern Baja California, Mexico. However, sightings may occur throughout much of the year during El Niño years when ocean temperatures rise. Sexual maturity ranges between 25 and 35 years. They are omnivorous, feeding on a variety of benthic prey including shellfish, crabs, oysters, jellyfish, squid, and occasionally fish.

Olive Ridley Turtle

The olive ridley turtle is the smallest of the Pacific marine turtle species. Although it is the most numerous sea turtle in the world (Stebbins 2003), it is considered federally endangered along the Pacific coast of Mexico, and all other populations are listed as federally threatened. Olive ridley turtles are primarily pelagic, migrating throughout the

Pacific from nesting grounds in Mexico and Central America to the north Pacific. Olive ridley turtles comprise the vast majority of sea turtle sightings in the world. Young turtles move offshore to occupy areas of surface current convergences until they are large enough to recruit to benthic feeding grounds. They feed on tunicates, salps, jellyfish, fish eggs, crustaceans, and small fish. Stranding records from 1990 to 1999 indicate that olive ridleys are only rarely found off the coast of California (NOAA 1997, 2007). Locations where olive ridleys have been seen in California waters include Point Loma, La Jolla, and Encinitas in San Diego County, near Noyo in Mendocino County, and near Table Bluff in Humboldt County.

Seafloor Habitat

As previously discussed in Section 4.2, Water and Sediment Quality, most of the deep seafloor within Santa Monica Bay consists of unconsolidated (soft) sediments (various mixtures of sand, silt, and clay) overlying a moderately sloping bottom, while the nearshore areas consist of sandy and soft-bottom sediments. Limited regions of hard-bottom substrate and kelp beds exist at the periphery of the Bay (Figures 4.2-2 and 4.3-2). The bay contains three submarine canyons: Dume and Redondo Canyons begin in shallow water, while Santa Monica Canyon begins at a depth of approximately 328.1 feet (100 m) at the edge of the continental shelf. A shallow shelf, known as "Short bank," between Santa Monica Canyon and Redondo Canyon, extends as a plateau from the 164-foot (50-m) contour and is characterized by patchy areas of exposed bedrock, rock pinnacles, gravel, and mixed sediments (Terry et al. 1956).

*Hard Bottom Substrate*

Natural hard substrate in Santa Monica Bay is primarily limited to areas adjacent to rocky headlands at the north and south of the Bay, submarine canyon edges, and the short Bank region (Allen 1982, Terry et al. 1956). Two minor, localized areas of hard substrate exist along the 40-foot isobath north of Berth 3's pipeline systems. And a man-made debris field near the Refinery's wastewater outfall is between the pipeline systems for Berths 3 and 4.

Hard-bottom habitats have a diverse and abundant assemblage of organisms that are often unique to their habitat (MBC 1993). These areas provide substrate suitable for attachment of a variety of plants and sessile invertebrates, as well as shelter and forage for more motile organisms. Sessile species utilizing hard-bottom substrate include mussels, rock scallops (Family Pectinidae), barnacles, sponges, sea anenomes, sea fans (Order Gorgonacea), feather duster worms (Family Serpulidae), wormsnails

(Family Vermetidae), and sea squirts (Order Ascidiacea). Most of these sessile invertebrates feed by filtering plankton and detritus from the water column. Motile invertebrates, including crabs, octopuses, and shrimp hide in crevices or are protectively colored. Invertebrates associated with hard bottom substrates are frequently a food source for birds (in the exposed intertidal zone) and fish (in the subtidal zone).

Nearshore reefs provide substrate for giant kelp (*Macrocystis pyrifera*), feather boa kelp (*Egregia menziesii*), and palm kelp (*Pterogophora californica*), which provide additional habitat for a multitude of organisms. Since most hard bottom habitats in the Bay are of low relief, the presence of kelp often lends a vertical element to the habitat that is otherwise lacking. Because reefs are diverse and have an abundance of unique organisms, they are also important sites for recreational diving and fishing (MBC 1993). California spiny lobster (*Panulirus interruptus*), yellow and Pacific rock crabs (*Cancer* spp.), red and purple sea urchins (*Strongylocentrotus franciscanus* and *S. purpuratus*, respectively), and spot shrimp/prawn (*Pandalus platyceros*) are fished recreationally in the region (MBC 1993). Abalone, another hard substrate organism, was fished both recreationally and commercially until the 1990s.

Kelp Beds

Rocky subtidal habitats in Santa Monica Bay and throughout much of the SCB are vegetated with a wide variety of red and brown algae (MBC 1993). Red algae generally form a low turf or understory of coralline, foliose, and filamentous forms from shore to the edge of the photic zone. Brown algae are generally larger and form an overstory; locally, feather-boa kelp is dominant nearshore, while giant kelp dominates deeper areas of reefs, forming large beds at depths of 20 to 120 feet (6.1 to 36.6 m) (CDFG 2001, Quast 1968a).

Giant kelp is a large, fast-growing, perennial algae that thrives in protected nearshore waters from Baja California to Santa Cruz (Druehl 1970). Kelp usually attaches to rock outcrops or large cobbles to stay in place; however, under calm conditions kelp plants have occasionally established themselves successfully in sandy subtidal regions as well, generally by attaching themselves to worm tubes (North 1971, Chambers 1991).

Giant kelp beds form an important and distinct marine habitat along the rocky coastal reaches of the SCB, particularly within the nearshore waters of the Channel Islands. While historically more widespread, during the past decade, kelp beds near the Project area have been limited to the extreme northern and southern portions of Santa Monica

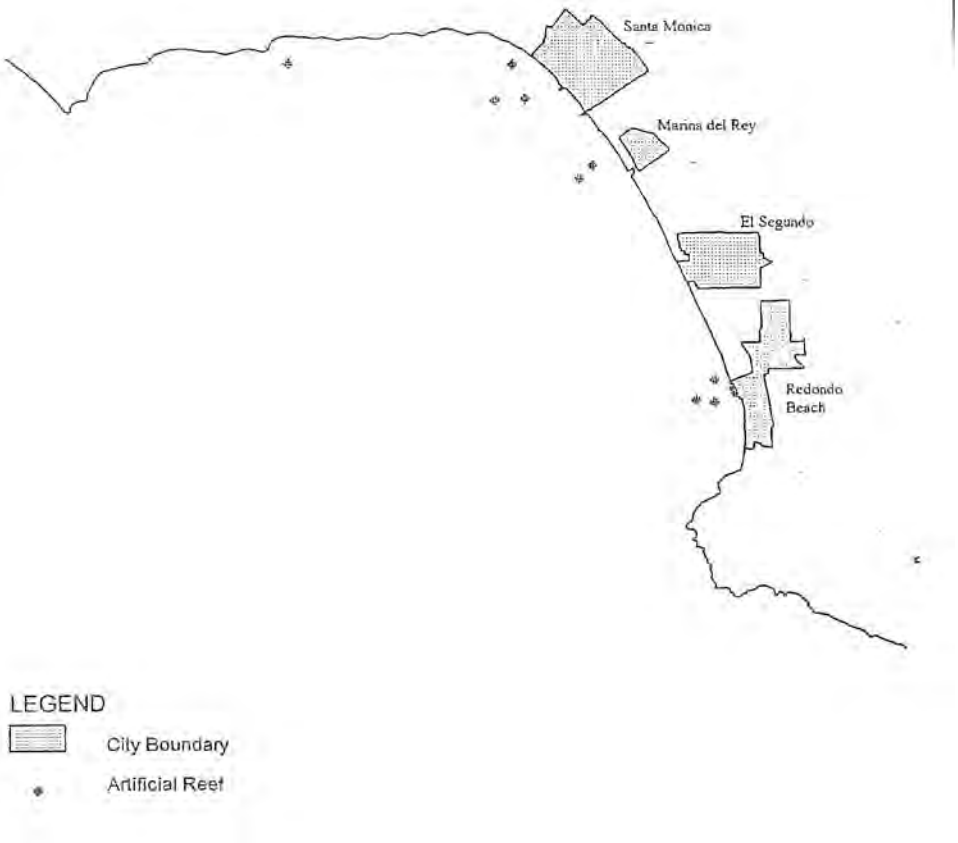
Bay (Figure 4.3-2). The rocky bottoms found offshore Leo Carillo State Beach, the Malibu coast, and along the Palos Verdes Shelf support the majority of the kelp stands within the Bay, although individual plants occasionally manage to gain a foothold on temporarily exposed rocks along the sandy, central portion of the Bay as well (MBC 1993) (Figure 4.3-2).

Most hard bottom habitats in Santa Monica Bay are of low relief. The presence of kelp in such areas creates a vertically structured habitat that extends from the seafloor all the way up to the sea surface. Giant kelp beds provide food, shelter, and nursery areas for a variety of invertebrates and fishes, some of which are uniquely adapted for life in the kelp beds. Kelp bass, black perch, rubberlip seaperch, opaleye, kelp rockfish, and olive rockfish (*Sebastes serranoides*) are all commonly encountered in kelp beds. Topsmelt, kelp pipefish (*Syngnathus californiensis*), kelp perch (*Brachyistius frenatus*), giant kelpfish (*Heterostichus rostratus*), kelp clingfish (*Rimicola muscarum*), and kelp gunnel (*Apodichthys* [=*Ulvicola*] *sanctaerosae*) are fishes known to frequent the canopy, or upper reaches of the kelp forest (MBC 1993). Lower down in the water column, where the leafy canopy is not as dense, yellowtail, white sea bass (*Atractoscion* [=*Cynoscion*] *nobilis*), rubberlip seaperch, halfmoon (*Medialuna californiensis*), and halfblind goby (*Lethops connectens*) can be found. Several of these species are important commercial and recreational fishery species. Giant kelp has historically been harvested commercially within the region for a variety of purposes (see Appendix G, Commercial and Recreational Fishing and Kelp Harvesting Resources).

Artificial Reefs

Because of the dearth of natural hard-bottom substrate in the area, and the burgeoning public demand for recreational fishing and diving opportunities, Santa Monica Bay has long been a favored area for the construction of artificial reefs (MBC 1993) (Figure 4.3-3). Artificial reefs have also been used in the area as mitigation for marine and recreational resources lost as the result of coastal development projects (Johnson et al. 1992). For example, Pratte's reef was constructed just north and offshore from the Marine Terminal in 2000 to mitigate for a lost surfbreak after a shoreline groin was installed. However, this reef did not achieve the desired goal and was subsequently removed in 2007.

**Figure 4.3-3**
**Artificial Reefs in Santa Monica Bay**




| Name[1] | Installation Date | Depth (feet) | Area (acres) | Reef Type |
|---|---|---|---|---|
| Malibu reef | 1961 | 60 | 0.5 | replication[2] |
| Topanga reef | 1987 | 28 | 2.0 | rock |
| Santa Monica reef | 1961 | 60 | 0.5 | replication |
| Santa Monica Bay reef | 1987 | 42-72 | 7.0 | rock |
| Marina del Rey #1 | 1965 | 65 | 3.2 | rock |
| Marina del Rey #2 | 1985 | 65 | 6.9 | rock |
| Hermosa Beach reef | 1960 | 60 | 0.5 | replication |
| Redondo Beach reef | 1962 | 72 | 1.6 | rock |
| Palawan reef | 1977 | 120 | 0.6 | wreck |

[1]Reefs are listed by location from north to south.
[2] Replication reefs were created to compare the viability of different construction materials and were comprised of streetcars, auto bodies, quarry rock, and concrete shelters.

Since 1958, the CDFG has constructed more than 33 artificial reefs within the southern California region. The first reef was constructed by submerging 20 discarded automobile bodies approximately one-half mile offshore Paradise Cove in Malibu. A second reef was constructed that same year off Redondo Beach using six wooden streetcars. The initial success of these reefs at attracting fish led to the development of a series of additional experimental 'replication' reefs of wooden street cars, car bodies, heaps of quarry stone, and cement boxes that were built at Redondo Beach, Malibu, Santa Monica, and Hermosa Beach in the early 1960s (Figure 4.3-3). The purpose of these replication reefs was to investigate the cost-effectiveness and relative value of different construction materials. Although successful in attracting fish, several of these earliest reefs were reduced to rubble within just a few years of emplacement, and have since disappeared or been supplemented with less degradable materials. Subesquent reefs were constructed primarily with quarried rock or concrete.

The nine artificial reefs still remaining in the nearshore subtidal area extend from Malibu to Torrance Beach; Figure 4.3-3 shows these reefs (Lewis and McKee 1989). Other artificial structures that provide hard substrate habitats in the Santa Monica Bay include outfall pipes, jetties, groins, and piers. The nearest and most substantial of these is the El Segundo groin, located near the southern boundary of the Marine Terminal site and extending 800 feet (244 m) offshore. This groin was constructed to protect the Chevron facilities from beach erosion.

Common fish species found on artificial reefs within the Bay include Blacksmith (*Chromis punctipinnis*) and senorita wrasse (*Oxyjulis califomica*). Popular sport fish species, such as kelp bass (Paralabrax clathratus). barred sand bass (*Paralabrax nebulifer*). California sheephead (*Semicossyphus pulcher*) and sculpin (*Scorpaena guttata*) have also been observed at the artificial reefs.

Abalone

Abalone are large marine snails associated with rocky intertidal and subtidal areas where they cling to rocks, feeding on kelp and other algae that they scrape off the substrate. Until recently, they comprised a highly valuable fishery in southern California. Of the abalone species historically found in the waters along the southern California coast near the Project site, two are currently listed as federally endangered while two additional species are recognized as Federal species of concern (Table 4.3-6). The primary factors contributing to the decline of these species are over-harvesting, illegal harvesting and trade, predation, disease, and El Niño events. Illegal poaching

currently constitutes the largest threat to the continued survival and recovery of these species.

**Table 4.3-6**
**Abalone Species of the Southern California Bight**

| Common Name | Species Name | Range | Likelihood at Site | Protected Status | Preferred Depth[1] |
|---|---|---|---|---|---|
| Black Abalone | *Haliotis cracheirodii* | Mendocino County to Baja California (Cabo San Lucas) | Possible | Federal Endangered | Intertidal to 20 ft |
| Green Abalone | *Haliotis fulgens* | Point Conception to Baja California (Bahia Magdalena) | Possible | Federal Species of Concern | Intertidal to ≥30 ft |
| Pink Abalone | *Haliotis corrugate* | Point Conception to Baja California (Santa Maria Bay) | Possible | Federal Species of Concern | 20 ft to ≥120 ft |
| White Abalone | *Haliotis sorenseni* | Point Conception to Baja California (Punta Abreojos) | Possible | Federal Endangered | Subtidal to ≥200 ft |
| Red Abalone | *Haliotis refescens* | Oregon to Baja California (Tortugas) | Possible | None | Subtidal to ≥100 ft |
| Threaded Abalone | *Haliotis assimilis* | San Luis Obispo to Baja California (Bahia Tortugas) | Possible | None | 20 ft to ≥80 ft |
| Flat Abalone[1] | *Haliotis walallensis* | British Columbia to San Diego* | Unlikely | None | 20 ft to ≥70 ft |

[1] ft = feet
[2] Flat abalone are no longer found south of Point Conception (Owen 2006).

Long-lived abalone are also slow to reach maturity, and their reproductive process is fraught with difficulties; females and males broadcast their respective eggs and sperm into the water column, requiring both ideal water conditions and adequate proximity between individuals of the opposite sex to succeed. Additionally, abalone have no blood clotting mechanism and are therefore particularly vulnerable to cuts and other injuries during attempts to remove them from the substrate.

Abalone were harvested in an intense commercial and recreational fishery that developed during the 1970s, then quickly peaked and crashed as they became increasingly scarce. By 1997, a moratorium was placed on recreational and commercial harvesting of all abalone in California south of San Francisco, and in 2002, the prized

white abalone became the first marine invertebrate recognized as requiring protection through listing as an endangered species.

In addition to overfishing, over the last decade a combination of poaching and a fatal wasting disease called "withering syndrome" has decimated remaining abalone populations, specifically the black abalone. The rickettsian bacteria that causes withering syndrome attacks the digestive tract of the abalone, leading to eventual atrophy of the foot. This results in increased vulnerability to predation and eventual starvation of the organism since the foot shrinks until the abalone can no longer adhere sufficiently to the substrate. In early 2009, the still declining black abalone was formally granted status as a federally endangered species.

*Soft Bottom Substrate*

Sandy substrates within the Santa Monica Bay are restricted to the innermost mainland shelf and a narrow outer shelf band north of Santa Monica Canyon. Cobble and gravel substrates are restricted to the innermost shelf south of El Segundo and limited parts of the shelf edge. Patches of sand and gravel are interspersed with rocky substrates on the high-relief marginal plateau and along parts of the shelf break just offshore Malibu (Edwards et al. 2003).

As detailed in Section 4.2, Water and Sediment Quality, sediments at the Project site, near the discharge of the Refinery, are primarily sand. Grain size decreases with increasing distance from shore, changing from medium sands to silts and clays. This sedimentary habitat supports a suite of infaunal organisms dominated by crustaceans, polychaete worms, and mollusks.

Infauna and Epifauna

The soft-bottom habitat of Santa Monica Bay supports a diverse and abundant infauna. As many as 1,200 infaunal species have been reported from Santa Monica Bay (Dorsey 1988). The abundance and distribution of infauna varies seasonally and interannually. However, infauna in the Santa Monica Bay is usually dominated, in both number of species and individuals, by polychaete worms. Most polychaetes either feed on the bottom by engulfing sediments and digesting the attached bacteria, filter feed on bits of organic detritus in the water, or prey on other infauna (Morris et al. 1980). Polychaetes play an important role in reworking the sediments and are important constituents in the diet of many demersal fish. Other important infaunal groups include crustaceans, mollusks, and echinoderms (Phylum Echinodermata).

The shallow, subtidal bottom between Redondo Beach and El Segundo has been surveyed in connection with National Pollution Discharge Elimination System (NPDES) permits for three electrical generating stations in addition to the Refinery's industrial discharge. No deleterious impacts on infauna from thermal effluent have been demonstrated around either the El Segundo or Scattergood Generating Station discharges (IRC 1979, 1981; MBC 1991b, 1992b, 1993, 1994, 1997-2005), or the Redondo Generating Station (EQA/MBC 1973; MBC 1986, 1992c, 1993, 1994, 1997-2005). In 1990, abundance, species richness, and diversity generally decreased with increasing distance from the Refinery discharge (MBC 1990a).

The infaunal community in the vicinity of the Refinery discharge is typical of the exposed nearshore environment in Santa Monica Bay (MBC 1999). Polychaete worms, arthropods, and mollusks were the most abundant infaunal species found at most sampling locations in the vicinity of the Refinery.

As mentioned previously, the abundance and distribution of infauna varies seasonally and interannually. Most of this variability is natural and is difficult to separate from variability associated with human impacts (Reish 1980, Bernstein et al. 1984). However, any disturbance of the sediments or oceanographic change is likely to affect benthic soft-bottom invertebrate populations. Severe storms during the El Niño period in 1983 may have been responsible for changes in the invertebrate assemblage of the SCB (SCCWRP 1986), including those off Palos Verdes (Swartz et al. 1986).

Epibenthic (living on the bottom) invertebrates of the Bay include sea stars, sea cucumbers, sand dollars, sea urchins, crabs, snails, and sea slugs. These organisms are larger than infaunal species, generally less common and, therefore, spaced further apart. However, sand dollars and sea urchins often occur in very dense, single-species patches that limit the abundance of other species.

In trawl surveys conducted in 1989 and 1990 in the vicinity of the Hyperion outfalls, California sand star (*Astropecten verrilli*), white sea urchin (*Lytechinus pictus = L. anamesus*), tuberculate pear crab (*Pyromaia tuberculata*), and thinbeak neck crab (*Podochela lobifrons*) were the most common members of the epibenthic invertebrate assemblages. Between 1997 and 1999 the most common epifaunal invertebrates in the vicinity of the Refinery included sand dollars, tube worms (*Diopatra* spp. and *Owenia* spp.), and a variety of crabs (*Cortunus xantusii, Pyromania tuberculata, Cancer antennarius, C. anthonyi,* and *C. gracilis*) (CEC 2002).

Demersal Fish

The extensive soft-bottom habitat within Santa Monica Bay supports an abundant and diverse assemblage of more than 100 species of demersal (living on or just above the bottom) fish. Flatfishes (Families Pleuronectidae, Paralichthyidae, Cynoglossidae, and Bothidae), rockfishes (Family Scorpaenidae), sculpins (Family Cottidae), combfishes (Family Zaniolepididae), and eelpouts (Family Zoarcidae) make up most of the soft-bottom fish fauna in the Bay (MBC 1993). The inner shelf assemblage is dominated by speckled sanddab (*Citharichthys stigmaeus*), the middle shelf by stripetail rockfish (*Sebastes saxicola*), and the outer shelf by slender sole (*Lyopsetta exilis*) (Allen 1982).

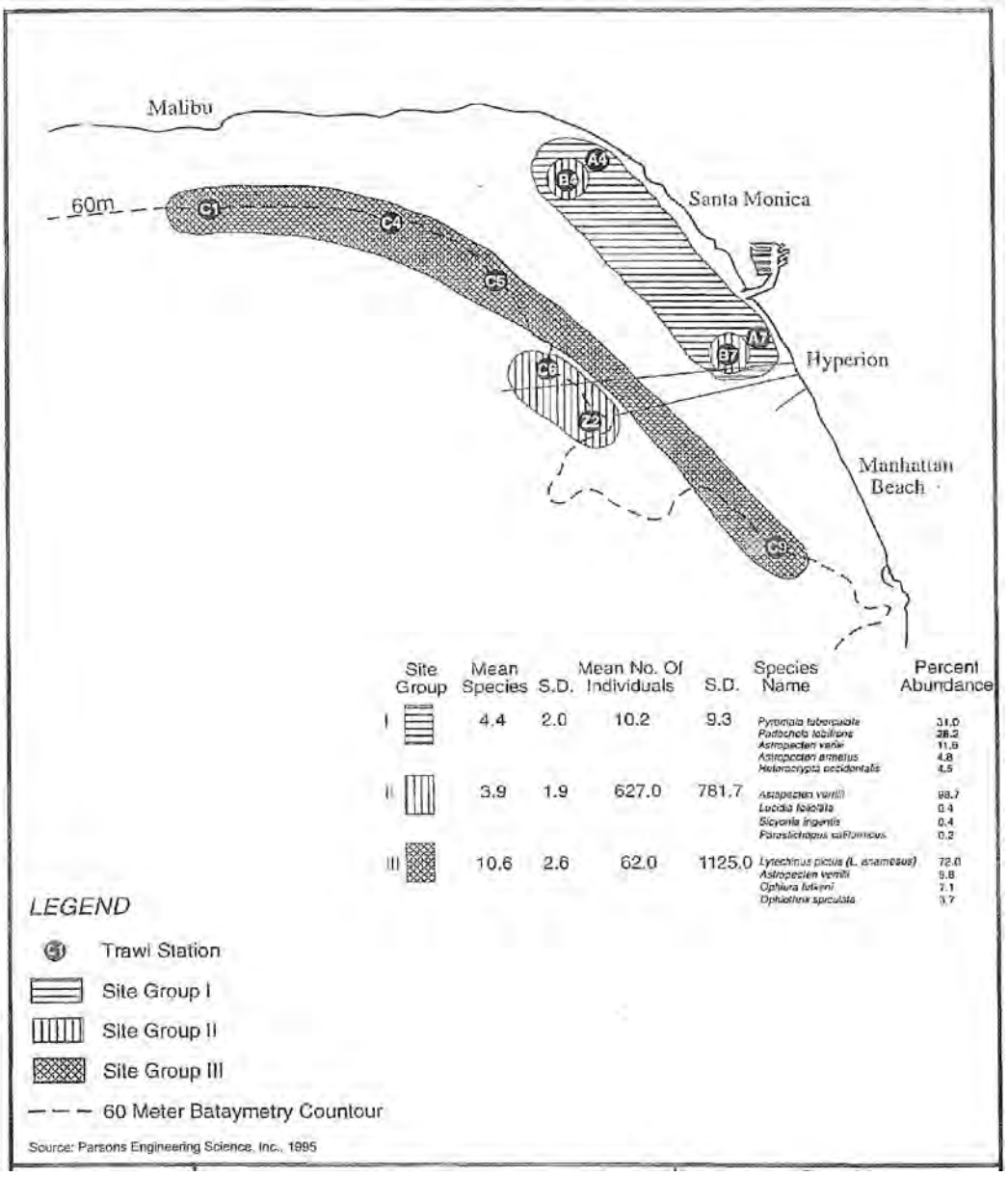
Dominant species collected in 1988 otter trawl surveys along the 20-, 40-, and 60–foot isobaths near Scattergood and El Segundo Generating Stations included white croaker, queenfish, speckled sanddab, spotted turbot (*Pleuronichthys ritteri*), and California halibut (OC 1989).

The following year, 1989, analysis of otter trawl surveys near the Hyperion Treatment Plant distinguished five demersal fish assemblages in the Project area (Figure 4.3-4). The dominant species found nearshore included horneyhead turbot (*P. verticalis*), speckled sanddab, California tonguefish (*Symphurus atricauda*), white croaker, and California halibut.

Over hard-bottom substrates, fish assemblages generally differ in composition relative to depth. Common shallow-water families include sea basses (Family Serranidae), surfperches, rockfishes, kelpfishes (Family Clinidae), sculpins, damselfishes (Family Pomacentridae), and wrasses (Family Labridae). Important species in Santa Monica Bay include kelp bass (*Paralabrax clathratus*), brown rockfish (*Sebastes auriculatus*), pile perch (*Damalichthys vacca*), black perch (*Embiotoca jacksoni*), white seaperch (*Phanerodon furcatus*), rubberlip seaperch (*Rhacochilus toxotes*), señorita (*Oxyjulis californica*), and opaleye (Carlisle et al. 1964, Stephens et al. 1984b, MBC 1987, 1993).

Rocky subtidal species found in Santa Monica Bay include woolly sculpin (*Clinocottus analis*), opaleye, rockpool blenny (*Hypsoblennius gilberti*), spotted kelpfish (*Gibbsonia elegans*), and California clingfish (*Gobiesox rhessodon*) (Cross 1982). These fish are generally small and well camouflaged. In deeper waters, vermilion rockfish, bocaccio, cowcod (*Sebastes levis*), and flag rockfish (*Sebastes rubrivinctus*) dominate (Allen et al. 1976, Moore and Mearns 1980).

**Figure 4.3-4**
**Trawl Stations Within Site Group Locations and Community Variables for Demersal Fish Assemblages in Santa Monica Bay, 1989-1990**




Shoreline Habitat

*Sandy Shoreline*

Exposed, medium- to coarse-grained sand beaches are the most common type of shoreline habitat in southern California and comprise approximately 26 miles (41.8 km) of the shoreline along the Santa Monica Bay, extending from Malibu Point to Flat Rock Point near the Palos Verdes Peninsula, including the shoreline directly adjacent to the

Marine Terminal (CDFG, OSPR 1993). This habitat type is subject to tidal extremes, variable surf conditions, and seasonal differences in beach profiles and sediment grain size.

The sandy intertidal community of Santa Monica Bay consists largely of infaunal (living in the soft bottom substrate) organisms such as polychaetes, bivalves, and crustaceans. The blood worm (*Glycera dibranchiata*) is an infaunal polychaete that feeds on bacteria, microalgae, and smaller invertebrates beneath the sand. Bivalves include Gould bean clams (*Donax gouldi*) and pismo clam (*Tivela stultorum*); both species have declined in abundance over the years. The declines may be due to overfishing or habitat degradation (Shaw and Hassler 1989). Another recreationally important clam, the Pacific littleneck (*Leukoma staminea*), which is found in coarse sand and gravel near rocky areas, may also be subject to overfishing and habitat degradation (Chew and Ma 1987).

The most obvious sandy intertidal crustacean is the sand crab (*Emerita analoga*), which is collected commercially for fishing bait and is also an important food source for fishes that live in the surf zone. Individuals of this species burrow in the wave swash zone of high-energy sandy beaches where they often occur in dense aggregations (many thousands per square meter). Sand crabs are prey for a number of shorebirds and several species of fish including California corbina (*Menticirrhus undulatus*), barred surfperch (*Amphisticus argenteus*), and black croaker (*Cheilotrema saturnum*).

Another well-known intertidal visitor is the California grunion. Grunion are common inshore fish that serve as a significant food source for larger nearshore fishes. The species is unique because it "comes ashore" on sand beaches to spawn. It deposits its eggs in the sandy intertidal zone from late February to early September on the second night after the full moon. Spawning occurs near the peak of the high tide during and just after high spring tides (tides of highest magnitude during new and full moons). The fish leave on succeeding waves and the eggs remain until the next spring tides two weeks later, when eggs hatch and the larvae are carried out by waves.

*Rocky Shoreline*

Rocky shoreline habitats comprise only a small part of Santa Monica Bay; they are mostly in the extreme northern (Malibu) and southern (Palos Verdes Peninsula) portions of the Bay. However, jetties and groins throughout the Bay also provide small pockets of rocky intertidal habitat. Rocky intertidal areas contain diverse assemblages of algae, invertebrates, and fish. The diversity of algae and invertebrate species tends to

increase from high to low elevations. Most intertidal species vary with tidal elevation, restricted by their ability to withstand desiccation, competition, and predation (Doty 1971, MBC 1992a). Additionally, in areas subjected to heavy wave action, the lower intertidal zone may be expanded upwards and the upper intertidal zone restricted (Ricketts and Calvin 1968).

Plants in the rocky intertidal habitats of Santa Monica Bay typically display vertical zonation, with distinct species assemblages at different tidal levels, although the patterns may be disrupted by grazing by marine animals. Lichens dominate the splash zone (highest zone), whereas the upper intertidal (below the splash zone) flora includes green algae (Subphylum Chlorophyta) such as sea felt (*Enteromorpha* spp.) and sea lettuce (*Ulva* spp.), brown algae (Subphylum Phaeophyta) such as rockweeds (*Selvetia* spp.), and various red algae (Subphylum Rhodophyta). The middle intertidal includes a more diverse algal assemblage with red and brown algae. The lower intertidal consists of red and brown algae as well as surfgrass (*Phyllospadix* spp.) (Hedgepeth and Hinton 1961, Dawson 1966).

Invertebrates that live in the highest intertidal zones are typically shelled species able to tolerate exposure to the air for long periods of time. These species typically include periwinkles (*Littorina* spp.), barnacles (*Balanus* and *Chthamalus* spp.), limpets (Family Acmaeidae), and rock lice (*Ligia* spp.). In the upper intertidal zone, species diversity increases, with additional species of snails (Class Gastropoda), attached bivalves (Class Bivalvia), chitons (Class Polyplacophora), hermit crabs (Tribe Paguridea), and striped shore crabs (*Pachygrapsus crassipes*). The middle intertidal is marked by California mussels (*Mytilus californianus*) and gooseneck barnacles (*Lepas* spp.), both of which are filter feeders. A variety of sea anenomes (Order Actiniaria), snails, sea slugs (Class Opisthobranchia), octopuses (*Octopus* spp.), polychaetes (Class Polychaeta), barnacles, isopods, crabs and shrimp (Order Decapoda), and brittle stars (Class Ophiuroidea) are also found in this zone (MBC 1993). The lower intertidal is similar to the rocky subtidal. Sponges (Class Demospongiae), sea anenomes, polychaetes, snails, sea slugs, attached bivalves, octopus, bryozoans (Phylum Ectoprocta), amphipods (Order Amphipoda), isopods, shrimp, hermit crabs, crabs, sea stars (Class Asteroidea), brittle stars, sea cucumbers (Class Holothuroidea), sea urchins (Class Echinoidea), and tunicates (Subphylum Urochordata) are abundant in the low intertidal (Hedgepeth and Hinton 1961).

*Wetlands*

The Clean Water Act defines wetlands as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." This abundance of water means that wetlands are typically rich in bird, fish, and invertebrate resources and frequently serve as important feeding and resting places for migratory and resident birds.

Wetlands within the Project area are confined to the mainland coast. Several taxa that frequent these wetlands are Federal and state threatened or endangered species or state fully protected species. A more complete discussion of wetland and estuarine habitats and the sensitive species associated with them is included in Section 4.3.3, Onshore Biological Resources.

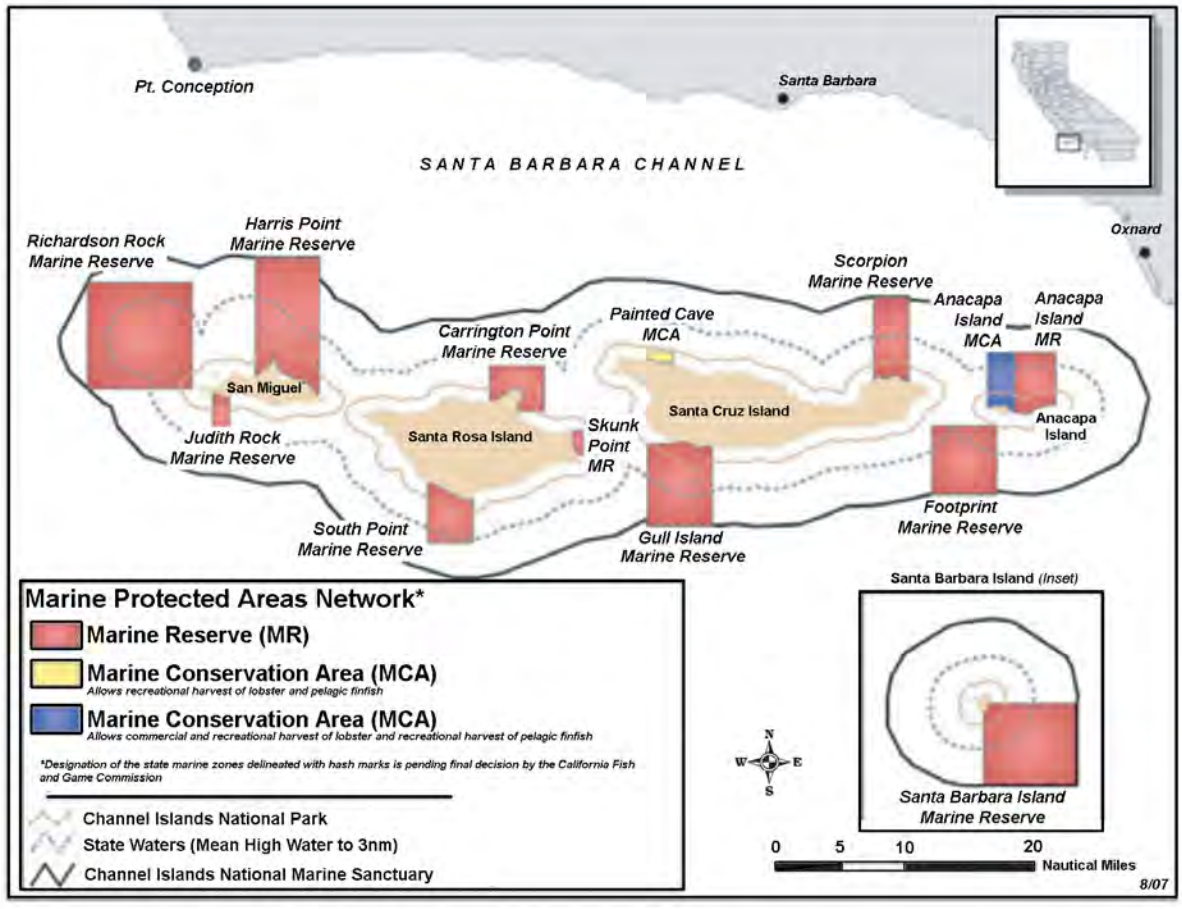
Marine Managed Areas

There is a wide array of both Federal and state managed marine areas off the coast of California. Within the SCB, a series of overlapping marine reserves and protected areas occurs off the mainland coastline and the coast of the nearby Channel Islands. Over the last decade, efforts have been made to integrate some of these areas under a uniform system of management and oversight. For example, the California Marine Life Protection Act of 1999 required the evaluation of existing data for some 220,000 square miles (569,797.4 $km^2$) of submerged state lands, and designated the California Department of Parks and Recreation (DPR) as the principal state agency for these areas. The following year, the California Marine Managed Areas Improvement Act of 2000 extended the DPR management jurisdiction into the marine environment. The purpose of both acts was to establish an integrated system of Marine Managed Areas (MMA), both existing and new, up and down the California coast that would ensure the long-term ecological viability and biological productivity of marine and estuarine ecosystems and preserve cultural resources in the coastal sea for future generations. The Marine Managed Areas Act describes six categories of MMA: state marine reserves, state marine parks, state marine conservation areas, state marine cultural preservation areas, state marine recreational management areas, and Areas of Special Biological Significance (ASBS).

*Marine Sanctuaries, Parks, and Reserves*

The most prominent and extensive of the nearby marine protected areas is the Channel Islands National Marine Sanctuary (CINMS). Created in 1980, CINMS surrounds the four northern Channel Islands of Santa Rosa, Santa Cruz, San Miguel, and Anacapa, out to a distance of six nm (11 km), encompassing a total of 1,658 square miles (Figure 4.3-5). Sanctuary regulations prohibit exploring for, developing, and producing hydrocarbons within the CINMS, except pursuant to leases executed prior to March 30, 1981, and except for laying pipeline, provided specified oil spill contingency equipment is available at the site of such operations.

**Figure 4.3-5**
**Channel Islands Network of Marine Protected Areas**




Source: NOAA 2007

Additionally, in October 2002, the California Fish and Game Commission approved a comprehensive marine zoning network in state waters of the sanctuary. The State implemented part of the marine zones in 2003, under the California Fish and Game regulations. Fishing and other extractive uses in the ten marine reserves and two conservation areas created within the CINMS were restricted in 2006 to provide protection to the seafloor and groundfish (CDFG and CINMS 2001, CDFG 2002). The NMFS designated the Federal water portions offshore of the state marine zones as habitat areas of particular concern and prohibited bottom fishing under the Magnuson-Stevens Fishery Conservation and Management Act.

Additionally, on July 29, 2007, NMFS finalized a plan that added approximately 20 square miles (51.8 $km^2$) of no-fish zone just off the southeastern coast of Santa Cruz Island and expanded the borders of several of the existing marine reserve areas. In total, the plan created 146.3 square miles (379.0 $km^2$) of strict no-fishing marine reserves and 2.3 square miles (5.8 $km^2$) of limited take marine conservancy zones. When taken in concert with the existing state marine reserves in the nearshore waters of the sanctuary, the combined sea life protection network totals nearly 215 square miles (557 $km^2$) of fishing-restricted ocean waters (Figure 4.3-5). An oil spill at the Marine Terminal or along transport routes to and from the Terminal could impact these areas.

*Areas of Special Biological Significance (ASBS)*

ASBS are designated by the State Water Resources Control Board to protect species or biological communities from undesirable alteration in natural water quality (McArdle 1997). This designation recognizes that certain biological communities, because of their fragility or value, deserve special protection. Under the California Ocean Plan (COP), the discharge of wastes to ocean waters in these areas is generally prohibited. The COP states: “Waste shall be discharged a sufficient distance from areas designated as being of special biological significance to assure maintenance of natural water quality conditions in these areas” (State Water Board 1972).

Most of the 14 ASBS in the SCB are associated with the offshore islands (McArdle 1997). Within Santa Monica Bay, the Laguna Point to Latigo Point ASBS extends from Latigo Point in the northern Bay around Point Dume and upcoast to an area just north of Mugu Lagoon in Ventura County (See Figure 4.3-1). This large ASBS has a coastline of 24.0 miles (38.6 km) and includes 18.5 square miles (47.9 $km^2$) of marine waters.

Eight additional ASBS, on the offshore Channel Islands, include all of the coastlines and much of the nearshore habitats of San Miguel, Santa Rosa, Santa Cruz, Anacapa, Santa Barbara, and San Nicolas Islands (See Figure 4.3-1). These areas have been recognized as biologically important and given a level of protection that includes prohibition on oil and gas extraction and recognition that damages causing or contributing to a measurable change in function of ASBS represent a significant impact. Five additional ASBS are located to the south, along the coastlines of Orange and San Diego Counties. The nearest of these are the Newport Beach Marine Life Refuge ASBS, the Irvine Coast Marine Life Refuge ASBS and the Heisler Park Ecological Reserve ASBS (both near Laguna Beach).

In addition, other sensitive areas exist throughout the SCB. Many, but not all, are included in the ASBS program or protected by state or local regulations. These areas include specialized communities or habitat that supports the presence of marine mammals, birds, or endangered species.

Ocean Acoustics

Ambient noise levels in the Santa Monica Bay include a combination of naturally occurring and anthropogenic sources (Table 4.3-7). Wind, surf, precipitation, biological noise, and seismic activity all contribute to the naturally occurring background noise levels found in the marine environment. Meanwhile, anthropogenic sources of noise include shipping, dredging and aggregate extraction, recreational activities, military operations, and scientific research. Variability in ambient noise in the sea is due, in large part, to variations in these noise sources, and levels at any given frequency may fluctuate by 10 to 20 decibels (dB) during the course of a day (Richardson et al. 1995).

Wind-generated noise results from various mechanisms, with oscillating bubbles in breaking waves representing the main source of noise above 200 Hertz (Hz) (Banner and Cato 1988). At low and moderate wind speeds, the greatest sound energy is generated in the range of 200 to 1,000 Hz. Wind noise varies with wind strength and other factors, including water temperature and density stratification. Typical noise levels are 66 ± 6 dB re 1 micro square Pascal per Hertz (µPa2/Hz) at 100Hz (a measure of sound-pressure density per unit frequency) for wind speeds 11.1 to 17.7 feet per second (ft/s) (3.4 to 5.4 meters per second [m/s]), though extreme levels up to 85 to 95 dB re 1 µPa2/Hz at 141Hz are predicted during storm events (McCauley 1994).